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Agricultural Sector Assessment

Volume 1 Summary Report

U.S. Department of Agriculture
in cooperation with the
U.S. Agency for International Development
and the
State Planning Commission
Syrian Arab Republic

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Agricultural Sector Assessment

Volume 1 Summary Report

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PREFACE

As one of five volumes comprising the Final Report of the Agricultural Sector Assessment, this volume presents a summary of the major findings and recommendations.

The overall objective of the assessment was to be of assistance to the Government of the Syrian Arab Republic in the development of: (a) the Fifth Five-Year Plan (1981-1985) by establishing an improved information and data base upon which to guide its formulation, and (b) an improved indigenous capacity and data base to carry out effective long-run economic analysis and planning of the agricultural sector.

The Syrian Agricultural Sector Assessment Project was carried out by the Office of International Cooperation and Development, USDA, in cooperation with the U.S. Agency for International Development and the Syrian Arab Republic under PIO/T 276-005-2-80020. The participation of the Syrian Arab Republic was provided through the State Planning Commission of the Prime Minister's Office, under the general direction of Hisham Akhrass, Deputy Minister of State for Planning Affairs, SPC.

(Continued)

The Syrian Agricultural Sector Assessment Project was implemented under the supervision of the resident project staff which included: USDA - William A. Faught, Team Leader and Co-Director; Wendell M. McMillan, Policy Economist; and Calvin C. Boykin, Jr., Production Economist; and SPC - Said Halabi, Co-Director; and Nour Barmada, Assistant Co-Director, who was succeeded during the last six months by Raghad Sheik El-Ard.

The preparation of technical reports was carried out through the use of contracts between the USDA and individual consultants, as well as the following organizations: the Mid-West Universities' Consortium for International Activities, Inc. (MUCIA), which prepared technical reports in the areas of human resources and agricultural institutions; the Department of Agricultural Economics of Texas A&M University, which prepared technical reports on the marketing systems for agricultural commodities and inputs; the Comprehensive Resource Inventory and Evaluation System (CRIES) project (USDA and Michigan State University), which used remote sensing imagery and other techniques to prepare technical reports on land resources and their use for agricultural production; the Mid-America International Agricultural Consortium, Inc. (MIAC), which provided the services of two specialists; and the Food and Agriculture Organization of the United Nations (FAO), which assisted in the development and computer analysis of the farm survey.

A complete listing of the many specialists and counterparts who participated in the project is given in the Appendix to this volume.

Preliminary drafts of the technical reports were provided to the State Planning Commission (SPC) in September and October 1979. Revised drafts were reviewed by Committees established by the Prime Minister's Office in early 1980. The comments and corrections of these Committees are incorporated to the extent possible into this Final Report.

The Final Report of the Agricultural Sector Assessment contains the following five volumes:

Volume 1 - Summary Report

Volume 2 - Natural Resources Annex

Volume 3 - Agricultural Production Annex

Volume 4 - Agricultural Marketing Annex

Volume 5 - Human Resources and Agricultural Institutions Annex

(Continued)

This Summary Report (Volume 1) presents the major findings and recommendations of the Agricultural Sector Assessment Project. Its eight chapters are based on the technical reports contained in the Annexes (Volumes 2-5), and on the technical work of the assessment project's resident staff.

Chapter I, Agriculture's Role in National Development, was prepared by Wendell M. McMillan; Chapter II, The Natural Resource Base, was prepared by Calvin C. Boykin, Jr. and William A. Faught based on reports in Volume 2; Chapter III, Agricultural Production, was prepared by Calvin C. Boykin Jr. and William A. Faught based on reports in Volume 3; Chapter IV, Agricultural Marketing, summarizes the reports in Volume 4; Chapter V, Human Resources and Rural Development, is based on the first seven reports in Volume 5; Chapter VI, Agricultural Institutions, is based on the last four reports in Volume 5, plus Section F., prepared by William A. Faught; Chapter VII, Public Policies and Programs, was prepared by Wendell M. McMillan; and Chapter VIII, Sector Development Recommendations, was prepared by the resident staff. Wendell M. McMillan coordinated the compilation and publication of the Final Report's five volumes.

June 1980

Syria: Agricultural Sector Assessment

Volume 1: Summary Report

CHAPTER I

AGRICULTURE'S ROLE IN NATIONAL DEVELOPMENT

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CHAPTER I

AGRICULTURE'S ROLE IN NATIONAL DEVELOPMENT

Agriculture has played a vital role in the economic and social structure of Syria over an extremely long time span. Not only was Syria the granary of the Roman east some two thousand years ago, it was also the origin, more than nine thousand years ago, of important domesticated plants. These include bread wheat, the major species of the world's most important cereal crop, as well as barley, lentils, peas and vetch.

Today, the natural and human resources of the agricultural sector continue to be of primary importance to the economic and social development of the Syrian Arab Republic. Agriculture has continued to provide a high proportion of the food commodities required by the rapidly growing population. It contributes substantially to gross domestic product (GDP), and it is the major source of employment in the nation. Agricultural exports are a major earner of foreign exchange, and the agricultural sector has continued to contribute to industrial growth, particularly since many manufacturing activities are based on inputs of agricultural raw materials.

The continuation and strengthening of agriculture's contributions to national development in the future, however, will require that increased efforts be made in order to fully develop and utilize the potentials of the natural and human resources of the agricultural sector. While recognizing that considerable potential exists for agricultural development, the Prime Minister at the 1977 Agricultural Seminar also emphasized that "several political, economic, financial, and human factors" have hindered the development of these potentials and have slowed the pace in achieving stated growth targets.

In order to assist decisions makers in dealing with problems of agricultural development, an assessment of the potentials of the agricultural sector was carried out, particularly with reference to the forth-coming 1981-1985 planning period of the next Five-Year Development Plan, and the findings and recommendations of the assessment are summarized in this volume. In this first chapter of the summary, the relative importance of the agricultural sector, and its various contributions to the national economy, are presented along with a review of the development goals that have been set forth for agriculture, particularly as they relate to national development. Then the planned and actual public investments that have been made for implementation of agricultural sector development programs and projects are examined, as well as the rate of progress that has been made in achieving targets set for agriculture under the current Fourth Five-Year Plan.

A. Importance of Agriculture

GDP and Employment

Agriculture continues to rank as one of the largest sectors of the Syrian economy. Although weather conditions cause more variability in output of agriculture as compared with other productive sectors, the agricultural sector accounted for 18 to 21 percent of gross domestic product (GDP) during recent years (1973-78), see Appendix Table I-1. In 1978, total GDP was estimated at SL 29.1 billion,^{1/} and the contribution of the agricultural sector was SL 6.2 billion, or 21.4 percent. By way of comparison, the contributions of the two other major sectors, industry and mining, and trade, have ranged in recent years from 18 to 25 percent of total GDP.

Over the 15 year period from 1963 to 1978, Syria's GDP has risen in constant terms from SL 4.0 billion to SL 11.4 billion. The average annual growth rate was 5.1 percent from 1963 to 1970 and 9.3 percent from 1970 to 1978. The value added by the agricultural sector over the same 15 year period rose in constant prices from SL 1.2 billion in 1963 to SL 2.0 billion in 1978, or at an average annual rate of 3.5 percent. However, the years 1963 to 1970 formed an essentially no-growth period, while during the 1970-78 period, the average annual growth rate of agricultural GDP was 7.2 percent.

Agriculture is also the major source of employment in the nation. The 1970 population census reported that about half of the labor force was employed in agricultural production, and a 1975 sample survey indicated that the relative share of employment in this sector has remained at just over 50 percent. In addition to direct employment in production, substantial number of persons are also engaged in the marketing, transporting and processing of agricultural commodities.

Trends in the growth of the agricultural sector can also be seen in terms of gross fixed capital formation. This includes, for agriculture, annual expenditures on productive fixed capital items such as tractors, irrigation systems, structures, breeding livestock and fruit tree saplings. Over the 14 year period 1963 to 1977, the value of fixed capital in constant prices rose from SL 96 million to SL 185 million, or at an average annual rate of 4.8 percent, see Appendix Table I-2. However, while the annual rate in the 1963-70 period was 11.5 percent, during the most recent period, 1970-77, the rate was negative, i.e., -1.6 percent. This trend is in sharp contrast to the growth rates in fixed capital formation for the economy as a whole, which were 6 and 19 percent for the two periods, respectively. Also, all other sectors showed positive growth rates, and in the cases of industry and mining, the average rate was only 4 percent per year from 1963 to 1970, but 36 percent per year from 1970 to 1977. Thus fixed capital formation in agriculture has been lagging substantially behind other sectors during the 1970s. Since the rapidly increasing output in agriculture during the 1970s reflects the substantial investments rates of

^{1/} Equivalent to \$7.5 billion at the official exchange rate of \$1 = SL 3.9

earlier years, a continuation of a negative or low rate in capital formation can have serious consequences for future output of the agricultural sector.

Food Supplies

By far the major contribution of any agricultural sector to the rest of its national economy is the provision of food commodities needed to meet nutritional requirements of the population. Syria has continued to produce a high proportion of the nation's food supply, although as a result of annual rainfall variations and the importance of rainfed crops, the output has fluctuated substantially from year to year. In addition, total production has been increasing at a more rapid rate in the 1970s than in the preceding decade. Nevertheless, per capita production has not been keeping pace with the rapidly expanding Syrian population, and continued increases in imports of food have been necessary to meet consumer needs.

From the early 1960s to early 1970s the long-term trend in agricultural output, measured in constant prices, was essentially flat, rising at an annual rate of only 0.2 percent from 1963-65 to 1970-72. Since then, from 1970-72 to 1975-77, the value of agricultural output has grown at an annual rate of 7.5 percent. The annual rate over this same period, 1970-72 to 1975-77, was 8.6 percent from crop production and 4.3 percent for livestock and livestock products, see Appendix Table I-3.

Over the same 14 year period, 1963-77, the trend in agricultural output per capita has been less favorable, reflecting the influence of a very rapid growth rate in population (3.3 percent per year). While the trend in total agricultural production was essentially flat during the early part of the period (0.2 percent annual average), the agricultural output per capita declined at an annual rate of -3.0 percent from 1963-65 to 1970-72. In addition, while total production has been increasing at a substantial rate in recent years (7.5 percent), the per capita output has increased much more slowly, averaging 4.0 percent per year from 1970-72 to 1975-77. Thus by the end of this 14 year period, the output per capita had about returned to the level of per capita output at the beginning of the period. Per capita rates of both crop and livestock production were negative in the earlier period (-2.2 percent and -3.7 percent per year, respectively), and the annual per capita growth rates in recent years, 1970-72 to 1975-77, averaged 5.1 percent for crops and 0.9 percent for livestock.

With per capita agricultural output lagging, imports of agricultural products have continued to increase in order to meet expanding food requirements. The value of food imports rose from an average of about SL 0.5 billion in 1970-72 to more than SL 1.1 billion in 1975-77, or at an annual average rate of about 19 percent, see Appendix Table I-4. It can be noted, however, that the value of non-agricultural imports have expanded much more rapidly, rising from an average of SL 1.2 billion in 1970-72 to SL 7.5 billion in 1975-77, or at an annual rate of 44 percent. Thus, the value of agricultural

imports as a proportion of total imports declined from 26 percent in 1970 to 11 percent in 1977. Among the more important food imports are sugar, dairy products, fresh fruit, and cereals, especially rice and wheat flour.

Export Earnings

Agricultural exports, chiefly cotton, continue to be important foreign exchange earners for Syria. Although their value has fluctuated from year to year, total agricultural exports rose from SL 530 million in 1970-72 to SL 853 million in 1975-77, an annual average growth rate of 10 percent. In 1977, the total value was estimated at SL 1.0 billion, see Appendix Table I-5. While agricultural exports have grown, their relative share has declined from about 55 to 60 percent of total exports in the early 1970s to about 24 percent in 1977. This reflects the major expansion in the value of crude oil exports from less than SL 200 million in the early 1970s to over SL 2.4 billion in 1977. Cotton has continued as the most important agricultural export during the 1970s, ranging from a low of 55 percent of total agricultural exports in 1972 to 82 percent in 1977. Other agricultural exports include tobacco, lentils, fruits, vegetables, wool and hides.

Industrial Growth

Raw materials supplied by the agricultural sector played a basic role in the establishment of a modern industrial sector in Syria during and after World War II, and during the industrial expansion of the 1950s and 1960s, textiles and food processing remained the most important branches of industry. Although increasing attention has been given to the engineering and chemical industries since the mid-1960s, agriculturally based activities continue to be the major sub-sectors of the manufacturing industry. In 1976, the gross output of food, beverage and tobacco activities was about SL 0.9 billion, and that of textile, clothing and leather was SL 1.3 billion. Together these agriculturally based activities amounted to 60 percent of the gross output of all public sector manufacturing industries.^{1/} Also by 1976, the accumulated investment capital in the public sector fields of food processing, textiles, engineering, chemicals and cement was about SL 2.7 billion.^{1/} Of this total, about SL 1.5 billion, or 55 percent, was invested in agriculturally based industries, including food, sugar and cereal processing, SL 335 million; textiles and cotton ginning, SL 515 million, and tobacco, SL 252 million. In the private sector, the accumulated investment capital was estimated at SL 461 million at the end of 1975, with 19 percent devoted to foodstuffs and 38 percent to textiles, with the balance to engineering and chemicals.^{2/}

^{1/} Central Bureau of Statistics, Statistical Abstract, 1978.

^{2/} "Evaluation of Industrial Investment in Syria", Syrie et Monde Arabe, October 1978.

In addition to its role as a major supplier of raw materials for food and textile manufacturing, the agricultural sector also provides a growing market for the output of other industrial sub-sectors such as engineering and chemicals. This linkage has grown as the modernization of agricultural production practices increased the demand for nonfarm-produced inputs, such as machinery and fertilizer. Although imports continue as the major source for most modern farm production inputs, the capacity of the domestic industrial sector for producing certain of these inputs has been expanding substantially. For example, in the case of fertilizer, the output of nitrogen fertilizer at the existing plant at Homs will be supplemented by the urea plant now under construction, and when completed, should meet all of the nitrogen needs of the agricultural sector. Also, construction of a triple superphosphate plant at Homs, using domestically mined phosphate rock, will have the capacity to meet the agricultural sector's demand for phosphate fertilizer.

Efforts to expand mechanization in agriculture have also influenced the domestic production of tractors and other farming implements. While still importing some tractors for resale, the tractor factory at Aleppo has gradually expanded local manufacturing capacity. By 1977, about 20 percent of the tractor components were manufactured locally, with the remaining components being imported for assembly at the factory. The factory also produces plows and disc harrows, mostly using imported components.

It can also be noted that in the process of agriculture's modernization, the increased cash incomes arising from the commercialization of the agricultural sector allows farm household members to increase their demand for consumer goods and services produced in the nonfarm economy, thus further increasing the growth potential of the overall economy.

B. Goals for Agricultural Development

The basic national goals and principles of the Syrian Arab Republic establish the overall environment within which the agricultural sector operates, and they broadly identify the sector's role in, and contributions to, national development. Because of these influences on the agricultural sector's own economic and social development, as well as on its various interactions with other sectors of the economy, the nation's general and developmental goals are first reviewed here. Then the agricultural sector goals are examined.

General Goals and Principles

Since the Revolution of 1963, the fundamental goal of the Government has been to build a popular democratic socialist state, so as to provide social justice (freedom and equality) and economic well-being for all citizens; to enhance basic values of Arab culture and tradition; and to further the cause of Arab integration (unity). Under the leadership of the Ba'ath Arab Socialist Party, the nationalization acts of 1963-65 began the change to a planned economy that is largely publicly owned and regulated. During the 1960s land was redistributed to large numbers of formerly landless peasants, under the Agrarian Reform Program.

The Corrective Movement of 1970 continued the commitment to the goals of the 1963 Revolution, but brought about a re-direction of national priorities. As formalized in the Constitution of 1973,^{1/} broader political participation was sought through formation of the People's Assembly and of the multi-party Progressive National Front, and through greater devolution of administrative powers and expansion of the role of the Ministry of Local Administration.

Under the economic principles set forth in the Constitution, Syria is to have a planned socialist economy that aims to abolish all forms of exploitation (monopolistic and commercial profiteering), and seeks to realize Arab economic integration. The state is to impose taxes on an equitable progressive basis, to endeavor to ensure employment for all seeking work, and to guarantee the principle of equal opportunity to all citizens.

Rights to property ownership are of three kinds: State ownership and administration of natural resources, public utilities and other public enterprises ^{2/}; collective property owned by popular and professional organizations, production units and cooperatives; and private property owned by individuals. Expropriation of private property is prohibited, except for the public's benefit, and then only against payment of equitable compensation. In addition, the right of inheritance is also guaranteed by the Constitution. Along with these rights, the State imposes the duty to use private property, and private and "mixed" enterprises, in ways that ensure the welfare of the people.

Private sector enterprises are chiefly engaged in retail trade, tourism, transport, construction and housing, crafts, light industry and agro-industries, such as poultry and cattleraising; but they are subject to price controls, licenses and other regulations. Agriculture remains largely private, although it is influenced by the government through redistribution of land to cooperatives and state farms, publicly owned credit and marketing organizations, and production and price controls.

National Development Goals

National goals which relate directly to the country's economic and social development are stated more explicitly in the form of resolutions adopted at Regional Conferences of the Ba'ath Party. These resolutions are then incorporated into the goals of the Five-Year Development Plans.

Current national goals for economic and social development are stated primarily in the 17 paragraphs of Annex 1 of the Fourth Five-Year Plan (1976-1980). In addition to these general goals of Annex 1, which tend to emphasize economic (productive or commodity producing) aspects of development, there are other goals of national scope contained in Annex 2. These goals are oriented more toward social development and relate to the service sectors (education, health, housing, and social services) and to Local Administration. The relevant

^{1/} Further provisions of the Constitution are outlined in Chapter VI of this report.

^{2/} Including mineral resources, banking, insurance, foreign trade, and all industrial establishments except those employing less than 10 persons.

paragraphs of the Fourth Plan, as well as the underlying resolutions of the Sixth Regional Conference, are listed in Tables I-1 and I-2. General goals of the Third Plan are listed in Appendix Table I-6.

Numerous specific goals have been listed in these documents. However, a convergence can be seen among them toward a few overall or basic goals, along with certain strategic or instrumental goals for achieving the more basic goals. These goals can thus be largely categorized under the headings of Growth, Self-sufficiency, Employment, and Equity, as follows. (FP refers to paragraphs in the Fourth Plan, and SC refers to the Sixth Conference.)

Growth

The goal of growth in GDP is set at a real rate of 12 percent per annum during the Fourth Five Year Plan, or at an annual per capita rate of 7.9 percent (FP1). Sources of this growth are implied in other goal statements which seek full utilization of physical resources (FP4), including the exploitation of idle agricultural resources (FP5), through establishment of a developed agricultural-industrial economy (FP2), and through improved productivity (SC10,11).

Self-sufficiency

The goal of self-sufficiency is repeatedly put forward in Conference Resolution and in the Fourth Plan. In its broadest form, national self-development is sought, and this is to be achieved on the basis of a developed agricultural-industrial economy (FP2). Full self-sufficiency is sought in major food and clothing commodities, and increased degrees of self-sufficiency in other commodities (FP6). As far as possible, self-sufficiency is to be achieved in energy (FP8) and in the means of agricultural production (FP9). Also a start is to be made toward self-sufficiency in the means of industrial production (FP9). In addition, domestic financial resources are to be increased substantially so as to become an increased source for financing development (FP13); and through training of personnel, the need for foreign expertise is to be reduced (FP15).

Employment

Optimal full employment is sought for Syrian manpower in general (FP5,SC1), with attention specifically called to mobilizing rural manpower for development of agriculture and rural areas (FP3, 5). Employment opportunities are to be increased through regional distribution of projects (FP3) and through technical training of personnel (FP15).

Equity

Achievement of a more equitable and just distribution of both economic and social conditions among citizens is another overall goal set forth for the nation. Greater equity in income distribution is sought among geographic regions, as well as between urban and rural populations (FP18). Contributing to this goal would be efforts directed toward optimal geographic distribution of projects (FP3), optimal full employment (FP5), and development of local administration (FP17).

Table I-1. National development Goals, Fourth Five-Year Plan, 1976-1980, Syrian Arab Republic ^{1/}

General Goals ^{2/}

1. To achieve a real annual average growth rate in Gross Domestic Product (GDP) of 12 percent (7.9 percent per capita).
 2. To establish a developed agricultural-industrial economy that will constitute a solid basis for stable self-development.
 3. To achieve optimal geographic distribution of projects among regions of the country so as to provide employment opportunities to rural manpower, and to improve rural living conditions and services.
 4. To seek full exploitation of natural, agricultural and mineral resources, and to protect and develop them.
 5. To provide optimal full employment, and mobilize rural manpower for developing idle agricultural resources and the rural areas in general.
 6. To achieve self-sufficiency in major food and clothing commodities, and increased degrees of self-sufficiency in other commodities.
 7. To raise nutritional standards of the population, especially in regard to high-quality foodstuffs.
 8. To provide self-sufficiency in energy as far as possible.
 9. To provide self-sufficiency in the means of agricultural production as far as possible, and move toward self-sufficiency in the means of industrial production.
 10. To develop the transport and communications networks internally, and externally, especially with the Arab countries.
 11. To speed up the gradual and voluntary replacement of individualism with cooperation in the sectors of agriculture, professions, housing, domestic trade and transport.
 12. To curb inflation, especially artificial inflation due to monopolistic practices.
 13. To achieve large increases in domestic financial resources, make then an increasing source of financing development, and improve the efficiency of the fiscal structure and of tax collection.
-

(continued)

Table I-1. (Continued)

General Goals (Continued)

14. To improve the systems of public administration so as to provide services to citizens at minimum cost and effort.
15. To provide the trained personnel required for various economic activities, and gradually dispense with foreign expertise.
16. To improve the balance of trade in consumer goods, and seek to achieve a surplus.
17. To stabilize and develop local administration so as to foster democracy and popular participation in the workings of a unified Arab socialist society.

Local Administration Goals 3/

18. To reduce the difference between Mohafazats, and between cities and rural areas within the same Mohafaza, as to the economic and social condition of citizens.
 19. To ensure real and efficient participation in the efforts directed toward the improvement of society at the local level.
 20. To increase forested areas in all Mohafazat, and particular in those regions requiring a forest barrier between the steppe and agricultural areas; and to increase the area and productivity of fruit tree orchards.
 21. To expand the carpet and mat making industry so as to increase employment for women in poor rural areas.
 22. To build dams and irrigation networks in some Mohafazats in order to increase irrigated area, provide drinking water, animal watering, fish production, and prevent floods.
 23. To improve existing roads, and to build new roads in agricultural and steppe areas, with stress on roads that will link population centers and projects with the chief cities and towns, as well as with the main road network.
-

(Continued)

Table I-1. (Continued)

Service Sector Goals 3/

- 24. To develop the educational system of the country (universities and institutes; pre-school, primary, preparatory, secondary and technical education; also cultural activities).
 - 25. To develop the health services of the nation (hospitals; health centers and clinics; health insurance).
 - 26. To expand construction of housing in the nation (public, cooperative, private), and to develop public utilities for drinking water and sewerage services.
 - 27. To develop social services in the nation (social welfare; social security; women's worker's and peasant's activities).
-

1/ Fourth Five-Year Economic and Social Development Plan of the Syrian Arab Republic, 1976-1980.

2/ Ibid., Annex 1

3/ Ibid., Annex 2. (Goals condensed and summarized).

Table I-2. National Development Goals, Sixth Regional Conference of the Ba'ath Party, 1975, Syrian Arab Republic. 1/

General Goals

1. Full employment for Syrian manpower.
 2. Develop commodity production to increase its proportion in the Net Domestic Product.
 3. Develop the services producing sectors so as to keep them in line with commodity producing sectors.
 4. Expand relations with other countries to ensure: (a) outlets for surplus domestic production, and (b) sources for modern equipment needed in investment projects, inputs, and final consumption goods.
 5. Establish an agricultural-industrial economy, stressing: increased livestock and crop production; establishments for processing agricultural products; projects aimed at import substitution; and greater supplies of consumer goods for the domestic market.
 6. Establish industrial plants for wider use of mineral and semi-mineral resources.
 7. Establish facilities to use water resources for irrigation and for generation of electricity.
 8. Ensure coordination and cooperation among the different economic sectors, and determine the amount of investment for each according to their needs.
 9. Improve the transportation and communication sector to solve problems resulting from the shortage of vehicles for persons and production.
 10. Provide trained and skilled manpower, and improve its productivity.
 11. Improve productivity by increasing the utilization of recently built production facilities, by modernizing other production facilities, and by improving the technical skill of workers.
 12. Select projects, coordinate them, and share in joint projects that will advance Arab economic cooperation.
-

1/ Economic Recommendations Adopted by the Sixth Regional Conference of the Ba'ath Party, April 1975, Damascus, Syrian Arab Republic.

Improved social conditions in all regions of the country, with separate mention of improved living conditions in rural areas (FP3), are to be achieved through development of the various sub-sectors: health services (FP25), along with higher nutritional standards (FP7); the educational system, including cultural activities (FP24); public, cooperative and private housing, along with drinking water and sewerage services (FP26); and social services including social welfare, social security, and women's, workers' and peasants' activities (FP27).

Other development goal statements in the Fourth Plan and the Sixth Conference refer to improved efficiency in public administration (FP24), including tax collection (FP23), as well as in the development of local administration (FP17); to improvement in the balance of trade in consumer goods, and achievement of a surplus if possible (FP16); to the curbing of inflation, especially artificial inflation due to monopolistic practices (P12); and to replacement of individualism with cooperation in agriculture, the professions, housing, domestic trade and transport (P11).

Agricultural Sector Goals

The Fourth Five-Year Plan sets forth five general goals for the agricultural sector, see Table I-3; but in addition, more than half of the Plan's 17 paragraphs on national goals deal directly with, or strongly influence, agricultural development, see Table I-1. Agricultural goals of the Third Plan and given in Appendix Table I-7, and recommendations on agricultural goals adopted by the Sixth, Fifth and Fourth Regional Conferences are shown in Appendix Table I-8. These various statements on agricultural sector goals can be categorized and reviewed for consistency under the headings of Growth, Self-sufficiency, Employment, Equity, and Contributions to National Development. (AG refers to paragraphs in Table I-3.)

Growth

Increased agricultural production has continued as a goal of major importance in Syria's Five-Year Plans. This goal is consistent with, and is an essential component of, national goals for growth in total GDP (FP1). Agricultural sector growth has been sought for both food and fiber products, and during the current Fourth Five-Year Plan a real growth rate of 8 to 10 percent per annum is to be achieved in agricultural GDP (AG1). During the first three years of this Plan, annual GDP growth rates have fluctuated considerably from year to year, with a decline in 1976-77, but averaged 7.6 percent from 1975-78, see Appendix Table I-1.

However, compared with experiences of other countries, to sustain an 8 to 10 percent annual growth rate over an extended period of years appears overly optimistic. Although high rates have been achieved for short periods, few countries have sustained annual growth of 5 percent in agriculture for any

Table I-3. Agricultural Sector Goals, Fourth Five-Year Plan, 1976-1980, Syrian Arab Republic ^{1/}

General Goals

1. To achieve a real annual average growth rate in agricultural GDP of 8 to 10 percent.
 2. To satisfy most consumer needs for food, and achieve self-sufficiency in important commodities within the guidelines of the Plan.
 3. To provide agricultural raw materials needed by domestic industry to produce the required output of manufactured goods.
 4. To achieve a surplus for export so as to contribute to reduction of the trade balance deficit.
 5. To raise nutritional levels of the population by increasing the proportion of animal protein in the diet, and by increasing the production of fruits and vegetables.
-

^{1/} Fourth Five-Year Economic and Social Development Plan of the Syrian Arab Republic, 1976-1980, Annex 2

number of years.^{1/} In addition, the 8 to 10 percent growth rate in agriculture requires, along with other factors affecting production, the achievement of various targets for crop area and yield. Some of these appear very ambitious for the five-year period, such as, for example, bringing under cultivation some 188,000 ha. of irrigated land in the Euphrates Basin and other areas and likely overstatement of potentials for yield increases of various crops and livestock products.

Self-sufficiency

Self-sufficiency was previously noted as an important goal of the Syrian Arab Republic (FP6). In conformity with this general goal, the Fourth Five-Year Plan also provides an agricultural sector goal which seeks self-sufficiency for the nation in important agricultural commodities (AG2). During recent years, improved trends in self-sufficiency ratios have been achieved for only a few commodities, chiefly eggs, potatoes and vegetables, while trends for all other commodities have been level or declining, see Chapter IV.

The goal of increasing domestic production so as to reduce dependency on imported products is based, in part at least, on the desire to secure the nation's supply of food and other essential commodities against unforeseen emergency situations.^{2/} However, it can be noted that achievement of this agricultural goal, while consistent with the national self-sufficiency goal, may not be compatible with other national goals. For example, to require self-sufficiency in certain commodities may involve production costs that exceed the cost of these items from abroad and thus restrict income to a level below its potential. Conversely, concentration on the production of commodities for which Syria has a relative comparative advantage would maximize income and minimize foreign exchange problems, but would hinder achievement of the self-sufficiency goal.

Agricultural self-sufficiency can also be defined in terms of agricultural trade balances, in which agricultural production is expanded so that the total value of agricultural exports exceeds the total value of imports. Viewed this way, the decision to export or import is based on an analysis of the returns to resources used in alternative farming enterprises. Decisions based on such analyses usually result in higher output and productivity than decisions that seek only to expand exports and reduce imports.

Employment

Statements on agricultural goals in the Fourth Five-Year Plan do not deal directly with employment. However, the Plan's national goal statements refer to optimal full employment for the nation as a whole, and also specifically calls for the mobilization of rural manpower in order to develop agricultural

^{1/} See Agriculture in 26 Developing Nations, Foreign Agriculture Economic Report No. 27, U.S. Department of Agriculture, Washington, 1965, Table 4; also, "FAO Index Numbers of Gross Agricultural Production", Monthly Bulletin of Agricultural Economics and Statistics, FAO, Rome, May 1971

^{2/} See, Speech of the Prime Minister at the Agricultural Seminar, Damascus, February 1977

resources and rural areas (FP5). Another statement deals with increasing rural employment opportunities through regional distribution of projects (FP3).

It can also be noted that goals for rural manpower are involved in, and are influenced by, the agricultural sector goal on growth in agricultural production (AGI). In addition, agricultural goals in the Third Five-Year Plan aimed at raising productivity of labor through training, supervision, and use of machinery and improved inputs; and at reducing seasonal unemployment (Appendix Table I-7).

Equity

Achievement of a more equitable and just distribution of economic and social conditions for rural citizens is referred to in several of the national goal statements. None of these statements deals directly with raising incomes of rural families, but greater equity in economic status is to be sought through reduction of differences between urban and rural areas, as well as among geographic regions. (FP18).

While not mentioned under goals of the agricultural sector, national goal statements specifically call for improved rural living conditions through regional distribution of project (FP3) and through improvement and extension of rural road networks (FP23). In addition, general improvements of social conditions are to be achieved throughout the country, including rural areas, through the development of health services, the educational system, housing and utilities, and social services (FP 24,25, 26, 27).

Contributions to National Development

Some dimensions of the important role played by the agricultural sector in national development were noted previously in Section I.A. Similarly, achievement of goals established for the agricultural sector can be seen as contributing in a fundamental way to the goals for general economic development of the nation. Most importantly, the goal of increased agricultural production contributes to the nation's growth by providing food commodities that are essential to all citizens. Also, with more than half of the nation's labor force in agriculture, employment goals seeking to mobilize rural manpower can be seen as important contributors to national development.

Three other goals set out in the Fourth Plan for the agricultural sector aim directly at contribution to national economic and social development, as follows.

Industrial Inputs. One of these is to provide the inputs of agricultural raw materials which are required for the development of manufacturing in the nation's industrial sector (AG3). This agricultural goal is thus consistent with national and industrial sector growth and self-sufficiency goals.

Trade Balance. Another of these goals seeks to have the agricultural sector achieve a surplus for export so as to contribute to reduction of the trade balance deficit. This goal is consistent with the sector's growth goal (AGI) and the national goals on the balance of trade (FP16). However, decisions on production of commodities for export need to be examined as to compatibility with the previously noted self-sufficiency goals stated for the agricultural sector (AG2) and for the nation (FP6,8,9), which goals call for emphasis on production for domestic use.

Nutrition. The third goal requires the agricultural sector to contribute to improvement of the nutritional levels of the population by increasing the availability of animal protein and of fruit and vegetable crops. This goal is consistent with the national goal on raising nutritional standards (FP7) as well as with national goals relating to more equitable and just distribution of social conditions among citizens. It also contributes to self-sufficiency goals since animal products and horticultural crops are major import commodities.

Agriculture and Goals of Other Sector

Because of numerous linkages and interactions with various other sectors of the economy, the development of the agricultural sector is strongly influenced by the nature of the goals set for these other sectors and by the degree to which they are achieved. Goals of other sectors which influence agriculture, as set forth in the Fourth Plan, are shown in Table I-4. (OS refers to paragraphs in this table).

In the supplying of agricultural production inputs, the goals of several sector are relevant. From domestic sources, the Industry and Mining Sector is to ensure availability of fertilizers and most agricultural machinery (OS1), while a goal of the Foreign Trade Sector is to ensure provision of these production inputs from other countries (OS15).

Most functions, involved in the marketing of agricultural products, both in domestic and foreign outlets, are influenced by the goals of numerous other sector. The timely and low cost transport of agricultural commodities from production areas to the various market outlets is to be provided by the Transport and Communications Sector (OS4). The processing and storage of agricultural products is influenced by goals in the Industry and the Domestic Trade Sectors (OS2,9,10,14). The Domestic Trade Sector has goals influencing the structure and operation of the wholesale and retail distribution system for agricultural products, including government, cooperative and private organizations, while export distribution is a responsibility of the Foreign Trade Sector (OS7,15). Also as with other commodities, the pricing of agricultural products, from the farm level through to the final consumer, is controlled in accordance with goals set for the Domestic Trade Sector, and influenced as well as by related goals which seek to achieve stability and uniformity of prices.

Table I-4. Goals of Other Sectors Which Affect the Agricultural Sector,
Fourth Five-Year Plan, 1976-1980, Syrian Arab Republic -1/

Industry and Mining Sector Goals

1. To ensure availability of the fertilizers (nitrogen and phosphate) and most agricultural machinery needed by the agricultural sector in achieving both crop and livestock production plans.
2. To process the raw materials that can be produced economically within the country for both domestic and export markets.
3. To locate industrial projects in various regions of the country as far as possible so as to provide wider employment opportunities.

Transport and Communications Sector Goals

4. To provide timely and low cost transport of industrial and agricultural products from production areas to consumption centers (intermediate and final), and to export harbours.
5. To improve postal and telecommunication services.

Domestic Trade Sector Goals

6. To adequately supply the demands of domestic markets with domestically produced and imported goods.
 7. To expand the domestic wholesale trade of the public sector through (a) marketing the products and imports of the public sector, and (b) helping the private sector in marketing its products in domestic markets.
 8. To extend government and cooperative participation in the retail trade in parallel with private trade in order to control the market and ensure price stability.
 9. To make available the supply of flour needed by all consumers in cities and in rural areas.
 10. To improve the bread making industry by covering the country with a network of mechanized bakeries.
 11. To control prices and to achieve the highest stability of prices during the Plant period.
-

(Continued)

Table 4. (Continued)

Domestic Trade Sector Goals (Cont'd.)

12. To make the prices of goods produced, imported and distributed by the public sector uniform throughout the country.
13. To make the pricing basis of the products and imports of the private sector uniform.
14. To make refrigerated and regular storage facilities available at suitable locations throughout the country.

Foreign Trade Sector Goals

15. To extend relations with other countries so as to ensure (a) marketing of surplus domestic production, and (b) supplying domestic markets with modern equipment needed for Plan implementation, with production inputs, and with final consumption goods.

(Targets growth rates for exports to average 7.0 percent per year, and 7.5 percent per year for imports.)

^{1/} Fourth Five-Year Economic and Social Development Plan of the Syrian Arab Republic, 1976-1980, Annex 2.

Various forms of infrastructure for agricultural and rural development, such as rural road systems, windbreaks to control erosion, and dams and irrigation networks, as well as postal and telecommunications services, are to be provided under goals set for the Local Administration, Communications, and Services Sectors (FP22,23,24,25,26,27,OS5).

C. Investment in the Agricultural Sector

As a primary means for achieving the national development goals outlined above, including those set forth for the agricultural sector, the Fourth Five-Year Plan for Economic and Social Development was adopted with a total public investment of SL 52.9 billion^{1/} planned for the period 1976 through 1980. In allocating this planned investment among various development programs and projects, about 61 percent of the 5-year total was to be shared by the three sectors most directly engaged in "productive" activities, i.e., 21 percent of the total, or SL 10.9 billion, was for agriculture; 23 percent, or 12.1 billion, was for industry and mining; and 17 percent, or SL 9.0 billion, was for energy and fuels. In addition, about 15 percent, or SL 7.9 billion, was earmarked for transportation and communications, and for domestic and foreign trade development. Thus, approximately 76 percent of the total planned investment was allocated for economic development, with the remaining 24 percent, or SL 13.0 billion, allocated for social development, including chiefly education, health and other social services, and housing and utilities, see Appendix Table I-9.

Of the total 5-year investment, 51 percent, or SL 27.2 billion, was allotted for completion of on-going projects that were carried over from the Third Plan. One-third of these funds were for the completion of agricultural sector projects, chiefly the Euphrates dam and basin development complex, and over one-half (56 percent) of the on-going projects were accounted for by industry, energy and transport. Funds allocated for new development projects were 33 percent of the 5-year total, or SL 17.6 billion. One-third of these new projects were for industry and energy, and nearly one-half (44 percent) were earmarked for social development projects. Projects included on a reserve list accounted for 15 percent of the 5-year total, or SL 8.1 billion, with over one-half of these funds allotted to industry, energy and transport, and one-third to social development.

The development funds allocated to the agricultural sector, SL 10.9 billion, were divided into three main categories, the largest by far being the Euphrates project. With funds totalling SL 7.4 billion over five years, this Dam and Basin complex accounted for 68 percent of all the funds allocated to agriculture, or 14 percent of the Plan's 5-year total. In addition, about SL 1.4 billion was allotted for irrigation and land reclamation projects in areas outside the Euphrates Basin, and about SL 2.1 billion was allotted for

^{1/} Equivalent to \$13.6 billion at the official exchange rate of \$1 = 3.9

development activities within the Ministry of Agriculture and Agrarian Reform (MAAR), as well as for General Organizations under the jurisdiction of the Minister of Agriculture. Of the total funds allocated for agricultural development over the Plan period, 83 percent were for completion of on-going projects, 13 percent for new projects, and 4 percent for reserve projects. All of the new and reserve projects were for development outside the Euphrates Basin.

Financial Implementation

The extent to which progress is being made toward achievement of national goals for agricultural development is reflected in the rate at which the Fourth Plan is being implemented. The rate of implementation can be examined in financial terms, including both the size and trend of annual allocations made to the various sectors, and the actual expenditures made by the implementing agencies on planned development programs and projects. In addition, implementation can also be examined in relation to achievement of the physical and other targets set for the agricultural sector in the Fourth Plan. Financial implementation of the Plan with regard to the agricultural sector, and other sectors affecting agriculture, are first reviewed in this section. The following section examines progress toward the Plan's physical targets for agriculture.

Agriculture vis-a-vis Other Sectors

Over the 5-year period of the Fourth Plan, it was planned that SL 10.9 billion would be allocated for development programs and projects in the agricultural sector, and the funds to be allocated annually would be determined on a year to year basis within the framework of the overall Plan. Although the amount of funds required to implement the Plan are not necessarily the same each year, the average annual investment needed for the agricultural sector would be approximately one-fifth of the 5-year total, or about SL 2.185 billion per year.

The annual allocation of funds that was made for the agricultural sector, however, ranged between SL 1.0 and 1.2 billion for 1976-78, and was SL 1.6 billion for 1979. Thus the annual allocations averaged only SL 1.242 billion, or 57 percent of the planned average investment. In contrast, it will be noted in Table 1-5, that the annual allocations made for other sectors as a group was 94 percent of the planned average investment over the 1976-79 period. For individual sectors, the annual allocations were 111, 93 and 100 percent of the planned average in the case of industry, energy, and transport, and ranged from 58 to 130 percent for the other non-agricultural sectors (except for the relatively small Popular Work sector where it was 540 percent).

Another way to assess the allocations made to the agricultural sector in relation to other sectors is to compare the percent of total funds planned for each sector in the 5-year Plan, and the percent of total funds allocated to the sectors over the four year period 1976-79. While agriculture was to receive 21 percent of the Plan's total, it actually had received allocations, through 1979,

Table I-5. Financial implementation of the Fourth Five-Year Plan, by sectors, SAR, 1976-79

Sector	Investment			Allocations		Expenditures		4 yr ave alloc. as % of total allocation
	5-year total (Mil. SL)	Annual ave. 1/ (Mil. SL)	Percent of total	4 yr ave as % of planned average	3 yr ave as % of planned average	3 yr ave as % of planned average	3 yr ave as % of 3 yr ave alloc.	
Euphrates Irrigation & Land Reclamation	7,439	1,488	14	49	45	30	66	8
Agriculture	1,405	281	3	61	46	23	51	2
	2,082	416	4	83	77	38	49	4
Sector sub-total	10,926	2,185	21	57	52	31	60	14
Industry & Mining	12,090	2,418	23	111	120	84	69	30
Energy & Fuels	8,974	1,795	17	93	105	74	70	18
Transport & Communications	6,691	1,338	13	100	94	56	59	15
Trade (Domestic & Foreign)	1,225	245	2	89	78	43	55	2
Housing Utilities	4,368	873	8	58	57	33	59	5
Services	7,440	1,488	14	67	74	40	54	11
Municipalities	1,034	207	2	130	101	72	71	3
Popular Work	159	32	-	540	303	169	56	2
Other sectors - sub-total	41,981	8,396	79	94	97	63	65	86
Total	52,907	10,581	100	86	88	56	64	100

Source: Appendix Table I-10 1/ 20 percent of the 5-year total

that averaged 14 percent. In contrast, industry received an average of 30 percent of all allocations through 1979, while the planned share was 23 percent. Energy and transport also received somewhat larger shares of the allocations. Among other sectors receiving allocations at a lower level than planned were housing and utilities, and services.

While the development funds allocated to agriculture have lagged substantially behind the allocation made to all other sectors, the actual expenditure of allocated funds has also been at a slightly lower rate in the agricultural sector. During the three years 1976 through 1978, for which data are available by sector on development expenditures, the actual expenditures in agriculture averaged SL 0.671 billion. Expenditures were thus 60 percent of allocations over the 1976-78 period. By way of comparison, the expenditure rate of all other sectors as a group was 65 percent during this same period, and for individual sectors ranged from 69-70 percent for industry and energy to 54-55 percent for services and transportation.

Combining a relatively low level of allocations made to the agricultural sector with a modest rate in expending the funds that were allocated, the average annual expenditure made on agricultural development (SL 671 million) was only 31 percent of the planned average investment, i.e., the average annual amount (SL 2.185 billion) that must be expended in order to equal the total 5-year allocation planned for the agricultural sector. For all other sectors, the average annual expenditure (SL 5.3 billion) was 63 percent of the planned average investment (SL 8.4 billion). For individual sector, the percentages ranged from 33 to 169 percent, with the industry and energy sectors achieving rates of 84 and 74 percent, respectively.

Agricultural Sector Programs

Within the agricultural sector, the investment planned over the 5-year period was heavily weighted toward irrigation and land reclamation in general, and toward the major Euphrates project in particular. About 16 percent of the sector's planned investment (SL 1.6 billion) was earmarked for completion of the Euphrates Dam, which it can be noted is designed for generation of electricity as well as for irrigation purposes. The construction of irrigation networks and reclamation of land for agricultural production throughout the Euphrates Basin, however, was the major development effort planned, with 54 percent of the sector's investment (SL 5.8 billion) allotted for this massive scheme. Also, an additional 13 percent of the sector's investment (SL 1.4 billion) was planned for irrigation and land reclamation projects outside the Euphrates valley. Thus, about 83 percent of the planned investment in agriculture (SL 8.8 billion) was primarily directed toward increasing agricultural production through the expansion and development of irrigated crop land, see Table I-6.

Table I-6. Financial implementation of the Fourth Five-Year Plan, Agricultural Sector, SAR, 1976-79.

Programs and Organizations	Investment			Allocations			Expenditures	
	Planned 5 year total 1/ (SL Mil)	Planned annual average 2/ (SL Mil)	Percent of total	4 Yr. as % of planned average	average as % of total alloc.	3 Yr. as % of planned average	3 Yr. as % of planned average	average as % of 3 Yr. alloc.
Euphrates Dam	1,657.0	331.4	16	85	22	81	67	83
Euphrates Basin	5,782.0	1,156.4	54	38	36	35	20	56
Euphrates sub-total	7,439.0	1,487.8	70	49	58	45	30	66
Irrigation-Public Works	432.9	86.6	4	73	5	49	16	32
Irrigation-Major Projects	953.0	190.6	9	57	9	45	27	61
Irrigation sub-total	1,385.9	277.2	13	62	14	46	24	51
Euphrates & Irrigation	8,824.9	1,765.0	83	51	72	46	29	64
MAAR 3/	659.4	131.9	6	107	11	91	60	66
General Organization-Poultry	549.2	109.8	5	68	6	71	34	47
General Organization-Fisheries	59.6	11.9	1	122	1	131	77	59
-Fodder	103.0	20.6	1	147	3	158	127	81
-Cattle	499.0	99.8	4	86	7	75	5	7
General Organization Sub-total	1,210.8	242.1	11	85	17	83	32	38
MAAR & General Organization	1,870.2	374.0	17	92	28	86	42	49
Sector Total	10,695.1	2,139.0	100	58	100	53	31	60

Source: Appendix Table I-11

1/ The 5-year sector total shown here varies slightly (2 percent) from the sector total in Table I-5, the total in Table I-5 being from Table 1 of the Plan's Annex 3, and the total in this table being the sum of individual projects listed in the Plan's Annex 3.

2/ 20 percent of the planned 5-year total:

3/ Includes the Directorate of Real Estate, and the grain silo project being constructed by the General Establishment for Major Projects.

Other programs for agricultural development were allotted the remaining 17 percent of the sector's planned 5-year investment (SL 1.9 billion). This included the General Organizations established to expand the production of specific agricultural commodities or inputs (poultry, cattle, fish, fodder), for which 11 percent (SL 1.2 billion) of the sector's 5-year investment was earmarked. In addition, about 6 percent of the sector's total investment (SL 0.7 billion) was allotted to the Ministry of Agriculture and Agrarian Reform (MAAR) for development projects aimed at providing and strengthening supporting services and facilities such as commodity storage, veterinary care, pest control, seed and sapling production, renovating desert wells, research stations and agricultural machinery stations.

Other Sectors Affecting Agriculture

The development of the agricultural sector is also strongly affected by linkages with other economic sectors, primarily those relating to the input of supplies and services needed for agricultural production, and to the processing, storage and marketing of agricultural commodities. Public investment in these input and commodity marketing activities are largely concentrated in a number of General Organizations under the jurisdiction of the Minister of Industry, but also of Supply and Home Trade, Economy and Foreign Trade, and Petroleum and Mineral Resources.

The planned 5-year investment in programs and projects affecting agriculture totals about SL 6.1 billion, of which 41 percent (SL 2.5 billion) relates to input supplies, and 59 percent (SL 3.6 billion) to commodity marketing, see Table I-7. In the case of input supplies, nearly all of the funds (SL 2.3 billion) were devoted to facilities for the manufacture of fertilizer. Projects for commodity processing facilities were dominated by construction of textile mills (SL 1.5 billion) and sugar mills (SL 0.6 billion). Other processing facilities planned included flour mills and food canning factories.

In general, the level of allocations made for these projects through 1979 has exceeded the planned level of investments, allocations for input facilities averaging 109 percent of planned investments, and 118 and 101 percent, respectively, in the case of processing and storage facilities. The actual expenditures made on these projects over the 1976-78 period averaged 84 percent of the allocations.

Local Administration Projects

The Fourth Plan provides that about 11 percent of its total 5-year development funds (SL 6.0 billion) are to be utilized at the local level through local administration authorities, municipalities, and citizen participation projects. As shown in Table I-8, about 80 percent of the funds planned for these projects over the 3 year period 1976-78 were allocated to the local administration authorities. About 67 percent of these allocations were spent, so the level of expenditures was about 54 percent of the planned level for this period.

Table I-7. Financial implementation of the Fourth Five-Year Plan, other sectors affecting agriculture, SAR, 1976-79.

Programs	Investment			Allocations		Expenditures	
	Planned 5 year total (SL Mil)	Planned annual average/ (SL Mil)	Percent of total	4 Yr. as % of planned average	average as % of total alloc.	3 Yr. as % of planned average	average as % of 3 Yr. ave. alloc.
<u>Input Supplies</u>							
Fertilizer factories	1,929.2	385.8	32	116	34	113	88
Phosphate mines	384.6	76.9	6	88	5	39	43
Sub-Total	2,313.8	462.7	38	111	39	101	82
Tractors/credit	185.0	37.0	3	78	2	82	111
Input Total	2,498.8	499.7	41	109	41	99	84
<u>Commodity Marketing</u>							
<u>Processing</u>							
Food canning	298.5	59.7	5	83	3	58	70
Tanneries	117.9	23.6	2	80	2	88	96
Textile mills	1,467.0	293.4	24	107	25	105	84
Cotton gins	65.0	13.0	1	166	1	219	141
Sugar mills	632.6	126.5	11	196	18	183	87
Bakeries	265.0	53.0	4	48	2	23	48
Flour mills	447.5	89.5	7	114	5	71	85
Proc. Sub-total	3,293.5	658.7	54	118	56	106	85
<u>Storage</u>							
Refrigerated	131.8	26.4	2	112	1	33	72
Tobacco	151.0	30.2	3	91	2	38	47
Storage Sub-total	282.8	56.6	5	101	3	36	55
Marketing Total	3,576.3	715.3	59	117	59	101	84
Grand Total	6,075.1	1,215.0	100	113	100	100	84

Source: Appendix Table I-12

1/ 20 percent of the planned 5-year total.

Table I-8, Financial implementation of the Fourth Five-Year Plan, by local administration authorities, SAR, 1976-78 (Million SL)

Sub-sector	5-year Plan Total	3 Years (1976-78)			Alloc. as % of Planned	Expenditure as % of Planned
		Planned Invest. ^{1/}	Allo- cation	Expen- diture		
Education	2,456	1,474	893	750	61	51
Health	680	408	150	56	37	14
Social centers	105	63	48	22	76	35
Culture	142	85	27	12	32	14
Sub-total	3,383	2,030	1,118	840	55	41
Water Supplies	890	534	395	209	74	39
Roads	177	106	210	136	198	128
Sub-total	1,067	640	605	345	95	54
Agriculture	177	106	87	50	82	47
Irrig./drainage	80	48	92	60	192	125
Sub-total	257	154	179	110	116	71
Municipalities	1,034	620	626	447	101	71
Popular Work	160	96	289	163	301	169
Sales rooms	81	49	53	27	108	55
Total	5,982	3,589	2,870	1,932	80	54

Source: Appendix Table I-13

^{1/} 60 percent of the planned 5-year total.

These allocation and expenditure rates were similar to the rates achieved for the total Plan, see Table I-5.

Social services accounted for over half (57 percent) of the funds planned for the local projects during the 5-year period, and education was the largest sub-sector, accounting for SL 2.5 billion, or 41 percent of the total of these projects. During the 3-year period 1976-78, expenditures on education were 51 percent of the planned level. However, in the case of health projects, for which SL 0.7 billion was planned, the allocations were only 37 percent of the planned level, and actual expenditures on these health projects was only 14 percent of the planned level.

Projects for local roads and for public utilities, chiefly water supplies, were planned at a rate of SL 1.1 billion, or 18 percent of the 5-year total. Expenditures on water supplies over the 3-year period 1976-78 were 39 percent of the planned level, but expenditures on roads were 128 percent of the planned level.

A small part of these locally administered funds (4 percent or SL 257 million) were for projects directly involved in improvement of agriculture, such as fruit-tree planting, reforestation, completion of agricultural schools, and irrigation and drainage works. In addition, however, a part of the local funds can also directly affect rural levels-of-living through projects to develop infrastructure and provide social services in rural areas of the country. To determine the extent to which rural areas shared in these local projects, expenditures by local administration authorities were obtained for each sub-sector by Mohafazat over the 3 year period 1976-78. The Mohafazats were classified according to the proportion of their total population that was rural, and the average annual per capita expenditures on local projects in each sub-sector were then calculated. These per capita expenditures for urban and rural areas are shown in Table I-9.

In general, annual per capita expenditures on these local projects over the 3-year period 1976-78 were slightly higher in rural Mohafazates as compared with the more urban Mohafazats, i.e., SL 84.5 per capita in Mohafazats with 75 to 100 percent of the population classified as rural; SL 82.1 percent in Mohafazats that were 65 to 74 percent rural; and 81.2 percent in Mohafazats that were 26 to 52 percent rural.

With two major exceptions, this general pattern of higher per capital expenditures in rural areas prevailed during the 1976-78 period. In addition to agricultural projects, there were considerably higher per capita expenditures in rural areas for water supply and road projects. In the case of social services, rural areas had higher per capita expenditures for health projects, as well as for cultural and rural development centers. But as noted above in Table I-8, the total expenditures for health were much below the planned levels.

Table I-9, Fourth Plan expenditures by local administration authorities in rural and urban areas (average annual expenditures in SL per capita), SAR, 1976-78

Sub-sector	Percent of Population in rural areas			All Areas
	26-52 <u>1/</u>	65-74 <u>2/</u>	75-100 <u>3/</u>	
Education	34.8	27.1	27.9	31.9
Health	1.9	2.1	4.0	2.4
Social centers	9.8	1.3	1.1	0.9
Culture	0.3	0.5	1.2	0.5
Sub-total	37.8	31.0	34.2	35.7
Water supplies	5.0	17.6	14.5	8.9
Roads	3.3	8.1	11.0	5.8
Sub-total	8.3	25.7	22.5	14.7
Agriculture	1.5	3.6	2.3	2.1
Irrig./drainage	1.5	3.7	4.6	2.6
Sub-total	3.0	7.3	6.9	4.7
Municipalities	26.1	9.2	7.5	18.9
Popular Works	4.7	8.1	12.3	6.9
Sales rooms	1.3	0.8	1.1	1.2
Total	81.2	82.1	84.5	82.1

Source: Appendix Table I-13, and data by Mohafazats from The State Planning Commission.

- 1/ Includes the following Mohafazats, with percentage of rural population in parenthesis: Damascus Mohafazat and City (26.2); Aleppo (43.2); Homs (46.4); and Lattakia (52.0).
- 2/ Includes: Hama (64.9); Deir Ezzor (66.1); Sweida (69.5); and Idlib (73.5).
- 3/ Includes: Rakka (74.9); Hassakeh (76.2); Tartous (77.6); Der'a (85.1); and Kuneitra (100.0).

This general pattern, however, was clearly reversed for both education and municipality projects, which two sub-sectors accounted for 62 percent of all the funds expended over the 3-year period 1976-78. Per capita expenditures on education were substantially higher in urban areas, i.e., SL 35, as compared with SL 27 per capita in rural areas. Municipalities in the more urbanized Mohafazat also had substantially higher per capita expenditures for structures and public utilities than was the case for municipalities in rural areas, i.e., SL 26 per capita in urban areas and about SL 8 per capita in rural areas.

Physical Targets

Trends in the financial implementation of the Fourth Plan, as noted above, can provide indications as to the direction and extent of progress being made toward agricultural development. However, physical and intermediate targets had also been set for many aspects of the agricultural development process, and these, too, can be examined as to actual achievements made up through 1978, the third year of the five-year planning period, as well as in light of projected accomplishments for 1980, the last year of the current Five-Year Plan.

Target growth rates set for various crops and livestock products in the Fourth Plan are shown in Table I-10. (Tonnage targets are shown in Appendix Table I-14, along with actual production for 1976-78, and projected production for 1980). These average annual rates vary considerably among the various commodities, with half the rates set at 16 percent or less, and the other half ranging from 20 percent upward to 60 percent per year for sugar beets and 85 percent per year for green forage. That many of these higher rates were overly optimistic is indicated by the lower growth rates now projected for the 1980 output of these commodities. Or, as also shown in Table I-10, when the projected 1980 outputs are expressed as percentages of the original 1980 targets, about one-third of the commodities are expected to achieve 52 percent or less of the target (fodder legumes, food legumes, oil crops, sugar beets, and green forage).

Nevertheless, the nine other commodities listed are expected to achieve between 80 and 116 percent of the 1980 targets. Prominent among these are the horticultural crops, listed as fruits, tomatoes, onions and potatoes. Production of the livestock products meat, milk and eggs are also projected to reach 80 to 97 percent of their targets. As shown in Appendix Table I-15, these higher percentages for meat and milk reflect the influence of relatively great output of sheep products.

In the case of cereals, production largely depends on rainfall, and as shown in Appendix Table I-14, has fluctuated from year to year. But the projected 1980 output is estimated at about 80 percent of the Plan's target. Cotton production was planned to increase only slightly (1 percent per year), with increasing yields expected to compensate for cotton hectareage transferred to sugar beet production. The projected 1980 output of cotton is expected to be at approximately the same level as in the 1975 base year.

Table I-10, Achievement of agricultural production targets, Fourth Five-Year Plan, SAR, 1980

Commodities	Production as % of 1980 target		Average annual growth rates (%)	
	1978 Actual	1980 Projected	1980 Projected	1980 Target
Cereals	72	80	4	9
Food legumes	32	49	9	25
Oil crops	31	46	16	36
Sugar beets	13	30	25	60
Cotton	93	96	0	1
Potatoes	50	84	18	22
Tomatoes	106	100	6	6
Onions	85	92	8	10
Fodder legumes	34	52	12	28
Green forage	6	10	16	85
Fruits	79	116	14	11
Meat and fish	79	88	13	16
Milk	88	97	10	11
Eggs	49	80	15	20

Source: Appendix Table I-14 and I-15.

Intermediate Targets

In addition to the physical targets set for the production of specific commodities, the Fourth Plan also lists intermediate targets, Appendix Table I-16, the achievements of which are directly involved in meeting the primary physical targets listed above, Appendix Tables I-14 and I-15. These intermediate targets are classified under five headings (Land and Water, Dams, Services, Plan Production, and Animal Production) and the achievements over the 3-year period 1976-78 period can be summarized as follows.

Extensive land areas in the Euphrates Basin (240,000 ha) were to be prepared for irrigation by 1980, but by 1978, due to numerous technical and development problems, only 7,400 ha had been prepared, and the 1980 projection is set at 43,200 ha. Similar low implementations rates are also projected for irrigation development of areas in other regions. Achievement approaching the targeted levels are projected for soil classification, land registration, land surveying, and tree planting.

Except for the construction of 20 of the targeted 41 small dams, none of the 7 medium and 10 diversion dams are projected to be completed by the end of 1980. Only 2 of 47 planned irrigation and drainage networks for old and new dams are expected to be constructed by the target date.

Achievement were considerable toward reaching plant production targets by 1978, and are expected to exceed 1980 targets in nearly all cases for fruit-tree sapling and seed potato production, for pest, disease and weed control, and for seed treatment.

The targeted increase of 2 million head in the nation's sheep herd is expected to be essentially reached by 1980, and the distribution and care of high production cattle is projected to exceed the 8,000 head target. While none had been completed by the end of 1978, high production cattle stations with 9,000 head are projected for 1980, as compared with the target of 16,200 head. None of the 250 dairy cattle breeding cooperatives are expected to be established by the 1980 target date. Eight of 13 targeted poultry hatcheries are expected to be built by the end of 1980.

D. Conclusions

Agriculture continues to be of primary importance to the economic and social development of Syria. It is the major source of employment in the nation, and the sector continues to rank as one of the economy's largest in terms of contributions to GDP. Agriculture has continued to provide a high proportion of the food commodities required by a rapidly expanding population, and its exports are major earners of foreign exchange. Agriculture contributes to the growth of the industrial sector, both as a major supplier of raw materials for processing and as a purchaser of manufactured farm inputs and consumer goods.

However, the performance of the agricultural sector, while showing an upturn since the mid-1970s, has not kept pace with growing national development needs. Achievements towards goals of growth in agricultural output and self-sufficiency have lagged. Only since the mid-1970s has total agricultural production been at levels above those achieved in the early 1960s, and, reflecting the nation's very high population growth rate, per capita production levels have been lower in recent years than during the 1961-65 period. Food imports have continued to increase, and fixed capital formation in agriculture has lagged substantially behind other sectors.

The contributions that will be required of the agricultural sector for national development over the next two decades can be expected to result in substantially increased pressures for expanded production. Domestic demand for food, based on population growth alone, is projected to more than double by the year 2000, and considering likely income growth, to increase two-to-four fold. Demand for foreign exchange will also require continuing attention to production of agricultural commodities for export.

Agricultural sector goals, which can be categorized under the general headings of Growth, Self-sufficiency, Employment, Equity, and Contributions to National Development, are consistent with and essential to the achievement of national development goals. Also, the achievement of goals set for agriculture and for other sectors, especially industry and trade, is strongly influenced by the high degree of interdependence among the sectors.

The growth goal for agriculture, set at 8 to 10 percent per annum in real terms, appears to have been overly optimistic. Few countries of the world have had sustained annual growth rates of 5 percent in agriculture for any number of years. In addition, the 8 to 10 percent rate appears to be based on very ambitious targets for expanding area of irrigated land and for increasing yields.

The goal of self-sufficiency in important agricultural commodities, while consistent with national self-sufficiency goals, may not be compatible with other national goals. To require self-sufficiency in certain commodities may involve production costs that exceed the cost of these items from abroad and thus restrict income to a level below its potential. Conversely, concentration on the production of commodities for which Syria has a relative comparative advantage would maximize income and minimize foreign exchange problems, but would hinder achievement of the self-sufficiency goal.

Public investment for development of the agricultural sector during the five years of the Fourth Plan has been heavily weighted toward irrigation development, chiefly in the Euphrates Basin. With 83 percent of all the agricultural sector funds to be devoted to this sub-sector, only 17 percent of the total allocations was earmarked for development of all other sector programs and supporting services.

Annual allocations of funds to agriculture were substantially below the level of investment planned for the sector. Through 1979, the agricultural sector received only 57 percent of the annual allocations required to meet the planned investments. In contrast, other sectors received 94 percent as a group, with certain sectors receiving substantially higher percentages.

While the development funds allocated to agriculture have lagged substantially behind the allocations made to all other sectors, the actual expenditure of allocated funds has also been at a slightly lower rate in the agricultural sector. Through 1978, actual expenditures in agriculture were 60 percent of the allocated amounts, as compared with 65 percent for non-agricultural sectors.

Combining a relatively low level of allocations made to the agricultural sector with a modest rate of expending the funds that were allocated, the average annual expenditure made on agricultural development was only 31 percent of the planned average investment. For all other sectors the percentage was 63 percent.

Annual allocations made to other sectors for programs that affect agricultural development, chiefly involving construction of facilities for the marketing of inputs and commodities, have generally exceeded the planned level of investment. The actual expenditures made on these projects has averaged 84 percent of the allocations.

Annual per capita expenditures on Local Administration projects for infrastructure and social services were slightly higher in rural Mohafazats, as compared with the more urban Mohafazats, especially for water supplies and roads. But, expenditures were much below planned levels on health projects, and for education and municipality projects, the per capita expenditures were substantially higher in the urban areas.

Annual growth rate targets set for the production of many crop and livestock products in the Fourth Plan were overly optimistic, with about one-third of the commodities expected to achieve only 52 percent or less of the target. Other commodities, especially horticultural crops, are projected as achieving 80 to 116 percent of their targets.

Very low implementation rates are projected for the extensive irrigation development projects in the Euphrates Basin, and in other regions of the country. Targets on production and protection of plants are expected to be reached, as are those on increasing national sheep numbers. However, implementation rates have been very low on most other livestock production projects.

Syria: Agricultural Sector Assessment

Volume 1: Summary Report

CHAPTER II

THE NATURAL RESOURCE BASE

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CHAPTER II

THE NATURAL RESOURCE BASE

Agricultural development in Syria depends on the capabilities of the nation's natural resource base, and on the extent to which the potentials of these resources are achieved. Thus, in order to determine these potentials more fully, as well as to provide a basis for assessing alternative resource uses, a comprehensive inventory was made of agricultural land resources in terms of geographically identified Resource Planning Units (RPU's). Complementary studies on water, range, forestry and fishery resources were also carried out. In addition, to facilitate analyses of these resources, as well as to offer possibilities for use in future agricultural production planning, the RPU's were grouped into eight Type of Farming Regions, emphasizing the similarities of topography, climate, soils and farming systems within a region, and the differences in these characteristics among regions. Following brief sections on Syria's physical features, and on methodology used, this chapter summarizes the main characteristics and potentials of the nation's natural resources according to Type of Farming Region. Detailed data by RPU's and further information on methodology are given in Volume 2.

A. General DescriptionGeographic Features

Syria lies in the Middle East between $32^{\circ}19'$ and $37^{\circ}20'N$ and between 35° and $45^{\circ}25'E$. A land area of some 185,000 km², Syria overlooks the Mediterranean in the west, the Taurus Mountains in the north, and embraces part of the Arabian steppe-desert in the southeast. The narrow coast runs side by side with a twin chain of mountains separated by a rift valley. Inland occur the branching of the eastern chain of mountains and some individual mountains. Plains are located among mountain edges and near lowlands in the northwest bordering the Euphrates River and its tributaries in the north-central region, and extending to the Jezireh in the Northeast. The steppe-desert forms the south-eastern part of the country.

Elevations of 0-200m occur along the Mediterranean shore, part of the Ghab Valley, along the Euphrates River and the foot of the Golon Heights making up five to six percent of the country. Elevations reaching over 1000m occur in the mountains, composing about the same proportion of the total land area. Separate mountains and high plateaus cover about one-third of the country, with elevations ranging from 600-1000m. Land with elevations between 400-600m account for about 60 percent of the total land area and includes much of the central and south-western parts of the country.

Climate

The climate of Syria, generally modified Mediterranean, is distinguished by notably cool and rainy winters, summer with clear skies, no precipitation and high temperatures, and relatively short spring and autumn seasons. The rainy season begins in September over the coastal

and northeastern areas, spreading elsewhere in October, reaching maximum rainfall periods in December and January. Rainfall ends in May, except for the coastal area, where it extends to June.

Total annual precipitation ranges from 100-150mm in the southeast, 150-200mm from the south toward the central east-central areas, 300-600mm in the plains and along mountain edges in the west, 800-1000mm along the coast, increasing to 1400mm in the mountains.

Temperatures decrease with increasing elevations. The coastal area is milder in winter and cooler in summer than other areas, while the eastern and northeastern parts are hottest in summer. January is the coldest month, August the hottest. Average minimum temperatures in January generally is above 0°C except in the mountains where -2°C averages occur although 0°C temperatures may occur in most areas. Maximum temperatures in August range from 12°C-22°C in the higher mountains to 38°C-40°C in the east, northeast and southwest.

Soils

Use was made of existing soils map and additional field investigations, the results of which were reclassified in accordance with Soil Taxonomy ^{1/} to produce a soils map of Syria. This map, on which 81 soil units are characterized and identified, is designed to emphasize relationships which enhance predictions that soils scientists can make about the behavior of particular soils for certain stated purposes. In discussing on a regional basis the nature of these soil units only a few of the general characteristics are referenced here. More detailed presentation is made in Chapter I Land Resources of Volume 2: Natural Resources Annex. The grouping of Syria into eight regions is discussed later in this chapter.

The Coastal Region's soils for the most part are those formed from limestone on undulating plains, from calcareous sandstone on level plains, and to a lesser extent soils from basalt on rolling topography. In the Mountain Region of the northwest soils have formed from limestone on mountains, hilly topography and some rolling plains.

Soils of the Lowlands in northwestern Syria consists of soils from limestone on level plains, primarily, but include soils from alluvium, and lesser areas of soils from marl on hilly topography. Variable soils occur in the Undulating Plains, a region located in the vicinities and to the east of Homs and Hama, around Aleppo, and on either side of the Euphrates River in the north. Generally these are soils from limestone on level to Undulating or rolling plains. However, some soils have developed from basalt.

^{1/} Soil Taxonomy, A Basin System for Soil Classification for Making and Interpreting Soil Surveys. Soil Conservation Service, USDA. Ag. Handbook No. 436, December 1975.

Soils of the Euphrates and Tributaries Region consist of soils from alluvium on level plains for the most part, but include soils from unconsolidated materials on level to undulating plains. Also present are gypsum soils from weakly consolidated sedimentary rocks on undulating plains.

The Northeast Region which includes most of Jezireh Al-Hassakeh and Al-Kamishli, is characterized by some seven soil units which make up two-thirds of the land area. Soils of the largest segment are from weakly consolidated sedimentary rocks on rolling and undulating plains. A few soils are from basalt and also occur on rolling plains, while other soils are from marl on level plains. Some soils are from limestone on steeply sloping hills and escarpments.

The Southwest Region, located in the vicinity of Damascus and extending south to Dar'a and Al-Sweida, includes the Horan. Seven soil units together compose three-fourths of the region. These units include soils from basalt on rolling and undulating plains, soils from unconsolidated materials on level plains. Soils from limestone on steep hills and on level plains also occur.

Eight soil units together constitute the soils over two-thirds of the Steppe Region. They include soils from unconsolidated materials and limestone on level to rolling and Undulating Plains, soils from weakly consolidated sedimentary rocks on level plains and soils from basalt on rolling and undulating plains. Some soils are derived from limestone on steep hills and maturely dissected plains.

Water Resources

There are some 16 rivers in Syria, the largest being the Euphrates with a length in Syria of 602 km and an average flow of 1042 m³/sec. Al-Khabour and its tributaries extend 405 km and flow an average of 43m³/km., while the Orontes and its tributaries run some 325 km in length and flow at the average rate of 51 m³/sec.

The largest dam in Syria, located at Al-Tabka on the Euphrates forms Lake Al-Assad with a storage capacity of 11,600 million m³. Approximately 640,000 hectares of land are scheduled for irrigation with water from this dam. Medium-sized dams and storage capacity include the Al-Restan, 225 million m³; the Mouhardeh, 50 million m³; and the Taldo, 15.5 million m³. There are some 20 dams classed as small, the largest of which is the Dar'a dam with a reservoir of 15 million m³ storage capacity, the majority located near Homs and Hama.

Other than Lake Al-Assad, there are five lakes in Syria, the largest being Lake Jabboul near Aleppo, while Lake Qattineh is the principal lake in Syria that remains full all year long.

Springs with a flow rate exceeding 400 l/sec are numerous, most of them near Damascus, Dar'a, Homs, Hama and Lattakia. Underground water supplies are being developed and pumped for domestic, livestock and irrigation uses. There are almost 4,000 licensed wells in Syria, the majority in the Homs, Idleb, Al-Rakka and Al-Sweida Mohafazat. In the area north of the Damascus to Al-bu Kamal axis are numerous small wells which provide water for domestic and livestock needs, while to the south wells are less numerous and have lower water yields.

B. Concepts and Methods

Assessment of Syria's land, woods, range and livestock, forestry and fisheries resources involved several complementary activities. In assessing land resources the delineations were made of 53 Resource Planning Units (RPU's), and such references made to unmapped Production Potential Areas (PPAs) within each RPU. Each RPU and contained PPA exhibit relatively uniform physiographic, soil, climate, and plant characteristics.

Delineation of RPU's consisted of superimposing transparent copies of soil and crop/climate maps over topographic maps used as reference maps. The soil map was derived from van Liere's Soil Map of Syria, modified by additional documentary materials and judgements of Syrian soil scientists, and reclassified in terms of Soil Taxonomy, a soil classification system developed by the USDA. The crop/climate map used in RPU delineations was developed from that Climatic Atlas of Syria and its accompanying Agroclimatical Reference Book for the Syrian Arab Republic, and the climatic data files of the Economic Botany Laboratory, USDA. Also used were floristic data from a vegetation map of Syria and accompanying plant lists provided by the Directorates of Soils, MAAR. Field observations were made to confirm both classification systems used.

Using the physiographic, climatic and soils characteristics of the various RPU's and PPAs thus derived, estimates were made of productive capacities, susceptibility to erosion, and crop suitability ratings of each (Table II-1 and Appendix Table II 1-4). Subsequently, these characteristics and estimates were used, together with the advice of Syrian soil scientists and agriculturalists, in dividing Syrian into eight type of farming regions. Following this activity comparisons were made for each RPU and type of farming region between the current general land use as derived from the land cover/use map (Landsat imagery) and estimated crop suitabilities. Such comparisons identified lands by RPU's and region which could safely be retained in or brought into cultivation, cultivated lands which should be shifted to other uses, such as range, and lands with irrigated crop production potentials.

TABLE II-1. PRODUCTION POTENTIAL AND PRESENT LAND USE BY RESOURCE PLANNING UNIT AND TYPE OF FARMING REGION,
SYRIAN ARAB REPUBLIC.

REGION AND RPU.	AREA WITH POTENTIAL FOR:							PRESENT USE 1/ (000 HA.)				TOTAL AREA (000 HA.)
	RAINFED CROPS (000 HA.)			IRRIGATED CROPS (000 HA.)				EXTEN- SIVE 3/ —	ORCHARDS (000 HA.)	INTEN- SIVE 4/ —	OTHER 2/ —	
	HIGH	MED.	LOW	HIGH	MED.	LOW	OTHER 2/ (000 HA.)					
COASTAL	73	-	-	18	-	-	2	45	21	18	9	93
TOTAL	73	-	-	18	-	-	2	45	21	18	9	93
MOUNTAIN	4 ⁺	-	-	-	-	-	21	3	1	0	21	25
29	-	-	260	-	4	-	113	203	57	4	113	377
30	-	66	-	-	9	-	133	50	16	9	133	208
36	-	-	-	-	21	-	33	6	--5/ 9	21	27	54
37	-	-	-	-	-	-	31	5	9	0	31	45
58	-	14	-	-	-	-	331	267	83	34	325	709
TOTAL	4	80	260	-	34	-	331	267	83	34	325	709
LOWLANDS	-	298	-	82	-	-	4	241	28	82	33	384
26	-	21	-	-	56	-	9	8	0	56	22	86
34	-	8	-	-	-	-	34	21	1	0	20	42
35	-	-	-	-	-	-	1	21	16	2	10	49
47	46	-	-	2	-	-	48	21	45	140	85	561
TOTAL	46	327	-	84	56	-	48	291	45	140	85	561
UNDUL. PLAINS	-	83	52	31	-	-	667	371	1	31	430	833
20	-	23	-	15	-	-	-	33	0	--5/ 4	5	38
23	-	37	6	5	38	-	5	52	0	4	35	91
24	-	-	-	11	-	-	101	83	2	11	106	202
25	90	-	-	-	1	-	20	2	0	1	22	25
27	-	4	-	-	-	-	-	160	0	3	21	184
38	-	181 ⁺	-	3 ⁺	-	-	95	297	0	5	95	397
48	-	297	-	5	- ⁺	-	75	73	0	12	2	87
49	-	-	-	-	12	-	312	236	0	20	160	416
57	-	-	84	-	20	-	1275	1307	0	87	876	2273
TOTAL	90	625	142	70	71	-	1275	1307	3	87	876	2273

(Continued)

TABLE II-1. (CONTINUED)

REGION AND RPU	AREA WITH POTENTIAL FOR:							PRESENT USE 1/ (000 HA.)				TOTAL AREA (000 HA.)
	RAINFED CROPS (000 HA.)		IRRIGATED CROPS (000 HA.)			OTHER 2/ (000 HA.)	EXTEN- SIVE 3/	ORCHARDS	INTEN- SIVE 4/	OTHER 2/		
	HIGH	MED.	LOW	HIGH	MED.						LOW	
EUPHRATES AND TRIB.	-	-	23	295 ⁺	-	-	25	23	0	143	177	343
32	-	-	166	62 ⁺	90	-	33	106	0	50	135	291
40	-	-	55	35 ⁺	-	-	1	55	0	9	27	91
42	-	-	184	392	90	-	59	184	0	202	339	725
TOTAL												
NORTH- EAST	-	-	74	1	-	-	-	65	0	1	9	75
38	-	-	-	-	3	-	10	3	0	--5/	10	13
41	-	-	-	-	-	-	140	61	0	--5/	79	140
45	-	-	279	-	27	-	715	717	0	27	277	1021
46	-	-	169	-	25	-	-	165	0	25	4	194
50	-	-	67	-	-	-	157	124	0	0	100	224
51	-	416	46	-	-	-	-	462	0	--5/	0	462
52	-	71	70	-	-	-	-	141	0	0	0	141
53	-	156	-	-	-	-	-	144	0	0	12	156
54	-	-	-	-	-	-	31	15	0	0	16	31
55	-	-	-	-	-	-	-	40	0	0	0	40
56	40	-	-	-	-	-	-	1937	0	52	508	2497
TOTAL	40	643	705	1	55	-	1053					
SOUTH- WEST	-	110	-	-	73	-	-	79	0	0	104	183
2	-	-	284	11	-	-	33	235	--5/	11	82	328
3	-	-	-	-	-	-	157	103	0	0	54	157
4	-	121 ⁺	-	62	-	-	-	71	1	2	109	183
5	-	-	-	-	1	-	56	39	0	1	17	57
6	-	-	-	-	-	-	24	13	2	15	64	94
8	-	2	-	68	-	-	16	4	18	4	138	164
9	-	22	52	74	-	-						

(Continued)

TABLE II-1. (CONTINUED)

REGION AND RPU	AREA WITH POTENTIAL FOR:						PRESENT USE 1/ (000 HA.)				TOTAL AREA (000 HA.)
	RAINFED CROPS (000 HA.)		IRRIGATED CROPS (000 HA.)			OTHER 2/ (000 HA.)	EXTEN- SIVE 3/ ORCHARDS	INTEN- SIVE 4/ ORCHARDS	OTHER 2/		
	HIGH	MED.	LOW	HIGH	MED.					LOW	
SOUTH- WEST (CONT'D)											
10	-	4	-	62 ⁺	-	2	5	4	33	26	68
15	-	7	-	-	-	143	4	7	0	139	150
16	-	7	-	-	-	-	0	4	0	3	7
TOTAL	-	273	336	277	74	431	553	36	66	736	1391
STEPPE											
1	-	-	-	-	96	869	3	0	0	962	965
7	-	-	-	-	1606	802	1	0	0	2407	2408
13	-	-	-	-	174	115	6	0	0	283	289
17	-	-	-	-	194	-	-	0	0	194	194
18	-	-	-	-	511	57	10	0	0	558	568
19	-	-	-	-	197	1120	11	0	2	1306	1317
21	-	-	-	-	108	12	10	0	0	110	120
22	-	-	-	-	-	44	6	0	0	38	44
31	-	-	208	2077	-	1871	342	0	73	3741	4156
33	-	-	-	-	-	60	1	0	0	59	60
39	-	-	-	-	25	222	27	0	7	213	247
41	-	-	18	-	2	82	24	0	2	76	102
TOTAL	-	-	226	2077	2913	5254	441	0	84	9947	10470
SAR	253	1948	1853	2919	3293	8453	5023	188	683	12825	18719

1/ ESTIMATED PRIMARILY ON THE BASIS OF 1978 LANDSAT DATA.

2/ INCLUDES LAND ONLY WITH POTENTIAL OR PRESENTLY USED FOR RANGE, PASTURE AND FOREST PLUS NON-AGRICULTURAL USES FOR ROADS, URBAN AREAS, WATER OR BARREN.

3/ EXTENSIVE = SINGLE CROP, USUALLY NON-IRRIGATED FARMING.

4/ INTENSIVE = MULTIPLE CROPPING, USUALLY UNDER IRRIGATION.

5/ ---MORE THAN 0 BUT LESS THAN 500 HECTARES.

Another activity involved the processing of Landsat imagery into an interpretable format, thus identifying land cover/use through visual interpretations of the imagery. As developed, the soil, crop/climate and RPU maps were geocoded and incorporated into the computerized Land Information Subsystem (LIS). Also incorporated into the subsystem was mapped information on administrative boundaries, stabilization zones, hydrologic units, and land cover/use. Cross classifications of these data were made and the extent of land area contained in each classification were estimated for each RPU.

Water, range and livestock, forestry and fisheries resources were assessed through reviews and analyses of relevant published reports and unpublished data in the offices of the involved ministries. Field trips were made to observe the nature, use and general conditions of these resources. Interviews were conducted with ministry personnel, resource users and others to identify specific problems and to formulate suggested programs for further development of these resources. Data relating to the nature and extent of water resources were estimated for each RPU, while lands suitable for range or woodland as the most intensive land use are also estimated for each RPU.

Definitions Used

Definitions used in the main for classifying land resources employing the two underlying taxonomies, soil taxonomy and crop/climate taxonomy, are as follows:

Resource Planning Unit. An RPU is a geographically delineated unit of land (not necessarily contiguous) that is relatively uniform with respect to land forms, kinds and patterns of soil bodies, climates, water reservoirs and potential vegetation.

Production Potential Area: A PPA is an aggregated area of soil bodies and climates within an RPU which is sufficiently homogenous to be reliably depicted by unique estimates for national and regional analysis and planning.

Patterns of PPA distributions are defined as follows:

Intricate Patterned PPAs. When two or more PPAs generally occur in patterns composed of individual PPA bodies of less than five hectares. For national planning, such PPAs are considered as a single unit and represented by a single - valued input coefficient (productive factors) and any output (yield) coefficient.

Finely Patterned PPAs. When two or more PPAs generally occur in patterns composed of individual PPA bodies usually larger than five hectares. For national planning, finely patterned PPAs are considered as individual units for most management options but carry size constraints for some program and project purposes.

Coarsely Patterned PPAs. When individual PPA bodies occur within an RPU in coarse patterns that are predominantly larger than 100 hectares. Such PPAs are considered as separate units for regional planning.

General land cover/use classifications developed from Landsat imagery, which are closely comparable with the land use statistics collected by SARG for administrative units in the country are defined as follows:

Intensive agriculture -- areas with multiple cropping, usually under irrigation.

Extensive agriculture -- indicates areas normally with a single crop usually non-irrigated farming.

Range -- indicates areas where the potential natural vegetation is predominantly grass-like plants, forbs, or shrubs that can be used for grazing.

Water -- areas covered in water year-round -- oceans, lakes, reservoirs, and rivers.

Urban -- areas of intensive use with much of the land covered by man-made structures.

Forest -- areas of mixed deciduous and evergreen trees.

Orchards -- areas of cultivated fruit, olive, and nut trees, primarily non-irrigated.

Barren -- areas of land with limited ability to support plant life and less than one-third of the area covered in vegetation.

Type of Farming Regions

The type of farming region concept is used in bringing together certain groups of RPUs on the basis of rather broad similarities in locational, climatic, physiographic and soil characteristics, while at the same time giving considerations to the farming systems used including major crops grown, rotations, and the relative importance of irrigated and rainfed agriculture.

On the basis of these characteristics the land area of Syria was partitioned into eight type of farming regions, Fig. II-1. These regions include: Coastal, Mountain, Lowlands, Undulating Plains, Euphrates and Tributaries, Northeast, Southwest and Steppe. Each region's boundaries encompass one or more RPUs, and do not intersect any of the RPU segments.

Grouping the 53 delineated RPUs into the regions facilitates the analyses and discussions of their characteristics. There appears to be a widespread opportunity for using the regional approach in assessing land resource use potentials in planning agricultural production.

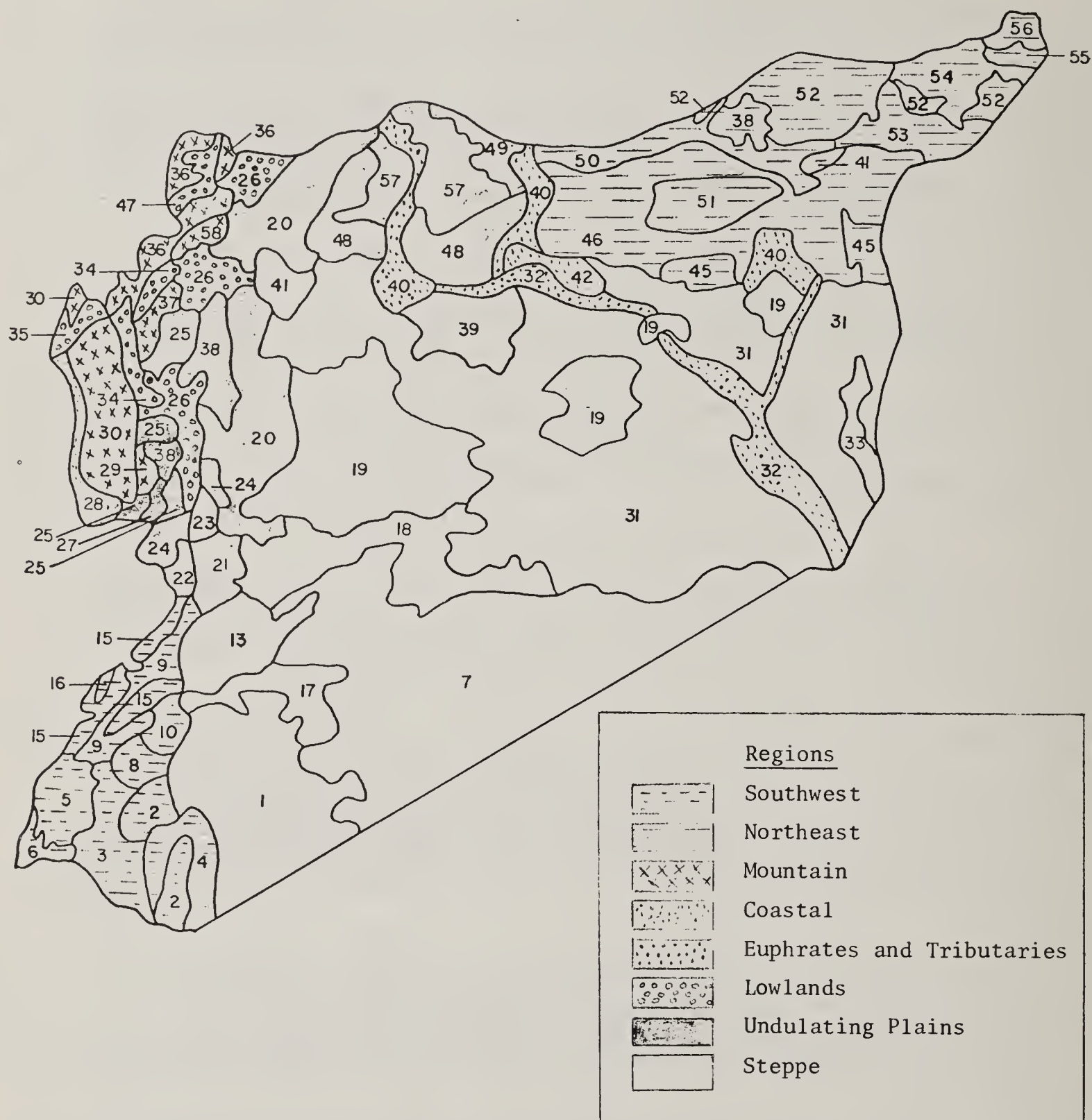


Figure II-1. Resource Planning Units Grouped by Type of Farming Region, Syrian Arab Republic.

C. Coastal Region

General Description

The Coastal Type of Farming Region, consisting of 92,600 hectares, comprises one half of a percent of the total land in the Syrian Arab Republic, (Figure II-2). The region, a narrow coastal plain extending from Lattakia south along the Mediterranean coast widens inland south of Tartous. Lying in the temperate zone, the climate of the region is mild, subtropical, and characteristic of the Mediterranean area.

General Land Use

According to land cover/use information interpretations over 70 percent of the land in the region is used for extensive agriculture and orchards. Almost 20 percent of the land is interpreted as being in intensive use, while land used as range amounts to only about eight percent.

Climatic-Physiographic-Soil Characteristics

All of the Coastal Region is contained in RPU 28, which has only one PPA, (Table II-1). Soils are deep alkaline clays that are moderately slowly permeable. Being fine textured, the clays are very hard and cracked when dry, and sticky and plastic when wet. Commonly the soils are stony and well drained, while the water holding capacity is low.

Elevations in the region range from sea level to approximately 100m, with dominant slopes of 0 to 3 percent.

Precipitation averages 750-1000mm annually, most of which comes during November-March. Average precipitation during the wet season is more than 125mm and average temperature during this period is 12-16°C.

Water Resources

Almost all of the Coastal Region lies in the Coast (Mediterranean) hydrologic unit; less than one percent of the region's land area lies in the Orontes hydrologic unit. RPU 28 is tied closely to RPUs 25, 30 and 35 since several coastal streams and springs originate in these RPUs.

There is one operational irrigation network at Sinn, while approximately 9,000 hectares are irrigated from the Sinn spring primarily. Two additional networks have been proposed which include parts of the region. The Akkar Plain has a proposed network for irrigation of 1500 hectares, while another network proposed near Lattakia would irrigate 13,000 hectares. The combined flow of the Abrache and Arouse rivers³ that would serve the development have been estimated at 110 million m³.

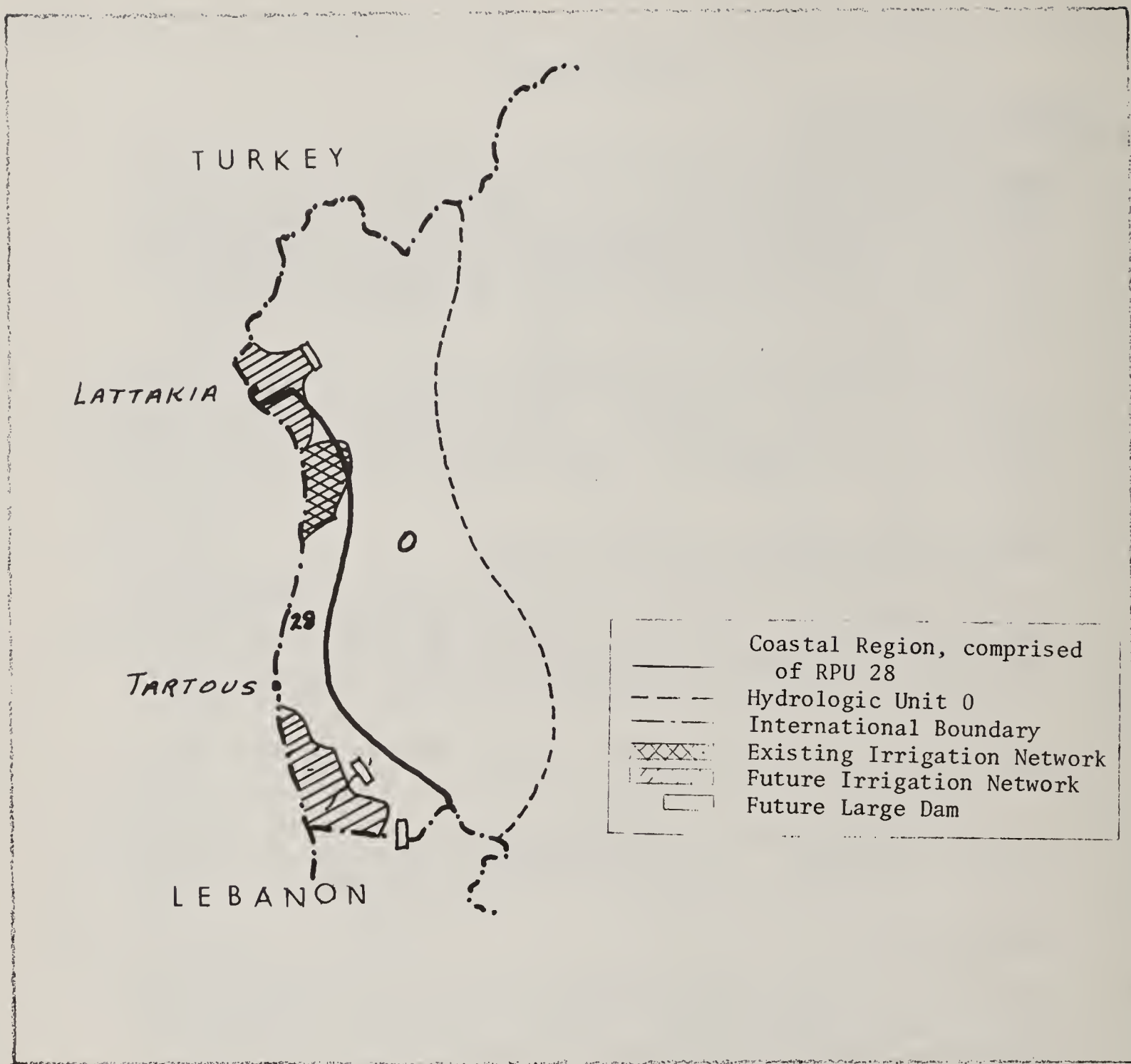


Figure II-2. Resource Planning Units, Hydrologic Units and Irrigation Facilities - Coastal Region.

Seven springs are located in the region; measurements of five average 3,363 l/sec. while the Sinn Spring averages 10,485 l/sec. Water Basin Administration tested seven wells in the Coastal Region drilled at depths averaging 24-289m which produced an average test yield of 6.9 m³/hr, four other test wells averaging 210m deep, yielded an average of 18.1 m³/hr.

Range Resources

According to interpreted land cover/use information there are 7,800 hectares of range in the Coastal Region, amounting to about eight percent of the region's total area. Ranges of the region populated by plants of the Mediterranean plant zone offer grazing to cattle, sheep and goats, although livestock head quartered here may also graze in the Mountain Region. Rarely are livestock moved into the Coastal Region from other regions for grazing and water. Residues from harvested crops in the region contribute to livestock feed requirements.

Forestry Resources

Only about 100 hectares of land classed as forest land appear in land cover/use information for the Coastal Region. This limited area, consisting of Quercus and the other hardwoods has practically no value for commercial timber production. With crop production cited as the most intensive use recommended for the region, there is little opportunity for further forest development.

Fisheries Resources

The main fresh water fisheries resource in the Coastal Region is the Sinn Trout Farm with a water supply of one cubic meter per second (1m³/sec.), the theoretical production amounts to 72,000 kg (72 kg per liter per second inflow). Limited by insufficient rate of change and excessively high water temperature during part of the year, together with high operating costs practically prelude economical production.

Fishing in the marine waters off the coast of Syria has not been very productive; the waters are low in fertility and there are no up-swells, nutrient-rich waters form the depths. Productive coastal waters that exist occur in a narrow band to 200m, dropping off steeply to abysmal depths, relatively unproductive of fish.

Crop Suitability Ratings

Climatic, physiographic and soil characteristics presented earlier, when analyzed in conjunction with plant characteristics suggest that the Coastal Region made up of PPA 28-1, has a high potential for both rainfed and irrigated production of pulses, vegetables, oil crops, and all tree crops, including citrus, but excluding rosaceous trees, (Appendix Table II 3 & 4). Medium potentials exist for rainfed production of small grains and grapes, with high potentials for these crops under irrigation.

Crop Production Potentials and Present Land Use

Of the 93,000 hectares of land in the Coastal Region 45,000 hectares are used in extensive agriculture, 21,000 hectares are in orchards, and 18,000 hectares are in intensive agriculture. The remaining land is in other uses, primarily range.

According to the crop suitability ratings for the region all except land now in water and urban uses has the potential for crop production (Table II-1). Land now in intensive use, 18,000 hectares, would be expected to remain in intensive use where high crop potentials would be expected under irrigation. Land now in extensive agriculture and orchards, some 65,000 hectares, could remain in this use with high potentials for rainfed crop production. In addition, expectations are that 8,000 hectares now in other uses (range and forests) could be brought into extensive agriculture with a high potential for rainfed crop production.

D. Mountain Region

General Description

The Mountain Type of Farming Region, some 709,000 hectares as delineated, comprises 3.8 percent of the total land area of the Syrian Arab Republic. The region includes the Jebel el-Ansariye and adjoining foot slopes separating the Coastal Region to the west from the Lowlands, including The Ghab to the east and the parts of the Undulating Plains to the northeast and southeast. Although the highest annual rainfall in Syria occurs in these mountains, steep, shallow and rocky soils preclude agricultural crop production potentials except for scattered small fields. The climate is Mediterranean.

General Land Use

According to geocoded mapped information about 38 percent of the Mountain Region is currently used for extensive agriculture, 12 percent for orchards, almost five percent for intensive agriculture, more than 28 percent for range, and over 17 percent for forests. Much of the crops production occurs on land that is terraced. The region is relatively insignificant in the nation's total intensive and extensive agriculture having only about five percent each of the total land in these uses. However, over 44 percent of the nation's orchards and 81 percent of the nation's forests are found here.

Climatic-Physiographic-Soil Characteristics

Five RPUs have been identified and described in the Mountain Region for agricultural planning purposes which include RPU 29,30,36,37, and 58 (Fig. II-1). Except for RPU 37, with two PPAs each of the other RPUs has only one PPA (Table II-1).

Steep slopes and soils shallow to the limestone bedrock and stony with outcroppings of the bedrock generally limit this region's agricultural crop production. Elevations range from 100-900m in the northern segment of the range, 300-940m in the east-central segment, and up to 1000m in the higher mountains occupying the largest segment of the region. Dominant slopes range from 10-15 percent to the south and east of Idleb and from 15-75 percent elsewhere (Appendix Table II-1).

Average annual precipitation, generally coming from November through March, amounts to 300-750mm at the lower elevations increasing to 1600mm at the higher elevations. Average monthly temperatures during the wet season generally vary from 7-11°C, although temperatures of 0°C or less do occur.

Soils are deeper in the northern segment of the region but elsewhere the soils are considerably less than 50cm in depth. Soil textures are generally moderate to fine with moderate permeabilities, low available water capacities, with drainage varying from moderately well to excessively drained.

Water Resources

Three hydrologic units are located in the Mountain Region. The Coast hydrologic unit encompasses 46 percent of the region, the Orontes 44 percent, and the Kwaik unit 10 percent (Fig. II-3). The Coast hydrologic unit (O) includes most of the mountaineous areas to the east of the Coast Region, the Orontes (N) includes the mountaineous and hilly areas in the northern and southwestern segments of the region, while Kwaik (B) unit extends over into smaller segments of the region in the northeast.

In the northwestern segment of the region one reservoir is under construction which will have a capacity of 15.5 million m³ and is scheduled for irrigation and domestic use. The Roudj Irrigation Network (3,150 hectares) is southwest of Idleb in the Orontes hydrologic unit. Some 25 springs in the northern segment of the region have average flow gauged at 26-720 l/sec. Nine wells drilled to average depths of 202-224m tested an average of 2.5-6.5m³/hr.

The central and southern segments of the region, lying primarily in the Coast hydrologic unit provide water for the Coast Region's irrigated areas. One reservoir east of Lattakia, capacity 3 million m³, is for domestic use, while another reservoir, adjacent to Turkey, has a capacity of 7.37 million m³ for irrigation. Three other reservoirs under construction south and east of Lattakia for domestic and irrigation uses have a total planned capacity of 21.44 million m³. Four reservoirs, capacity 22.75 million m³, are scheduled to be completed by 1981 for domestic and irrigation uses.

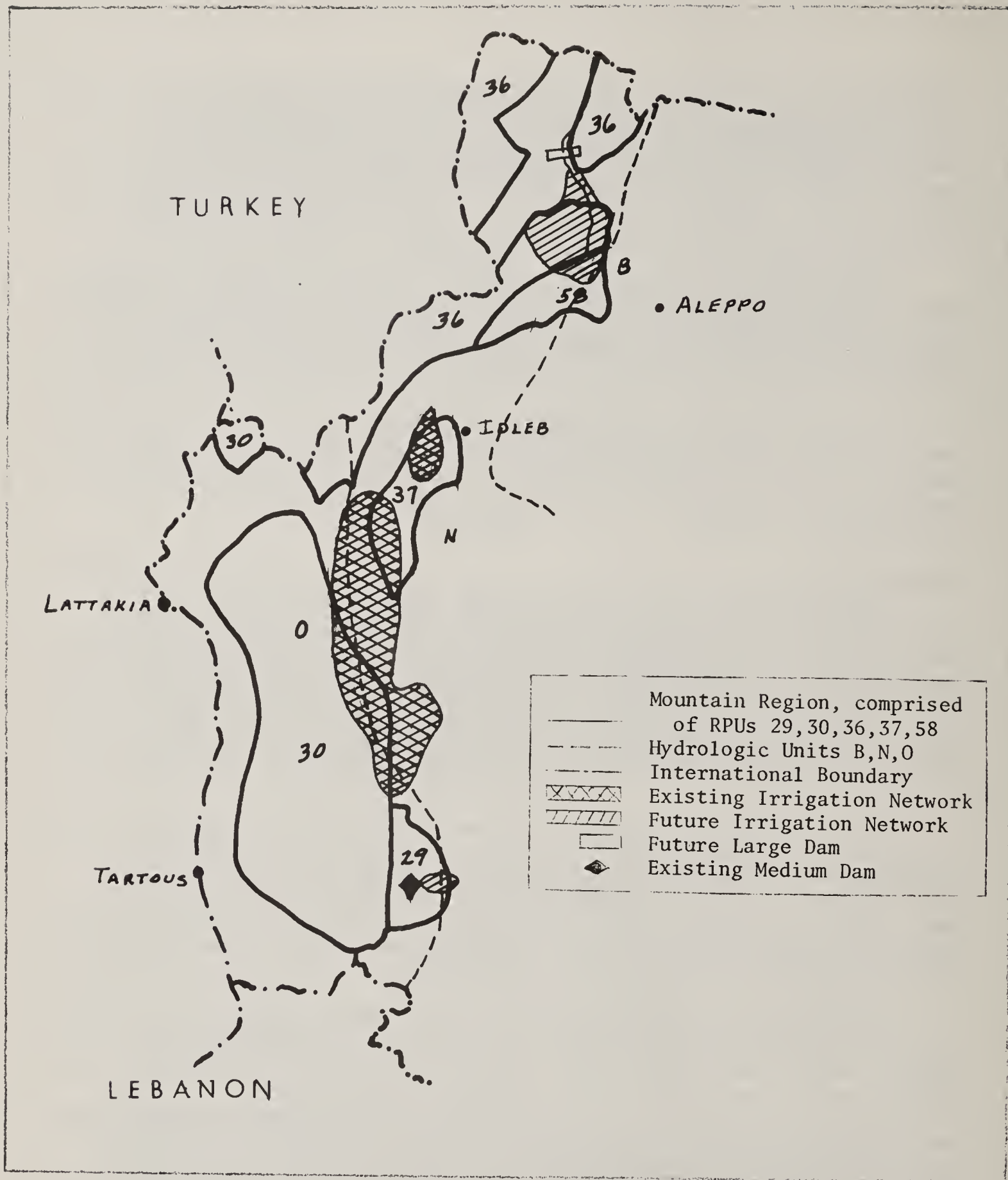


Figure II-3. Resource Planning Units, Hydrologic Units and Irrigation Facilities - Mountain Region.

Twenty-four springs occur in the Orontes hydrologic unit with flow rates averaging 406 l/sec to 3,863 l/sec. Seven springs are located in the coast hydrologic unit with flow rates of one at 500 l/sec. Some twelve test wells have been drilled in this part of the region at depths of from 23-33m with flows ranging from 14.9m³/hr to 34.4m³/hr.

Range Resources

The 201,000 hectares of range in the Mountain Region composes over 28 percent of the regions total land area. At the lower elevation plants of the Mediterranean plant zone populate most of the area but it also includes the west Syrian plant zones. The Cedar and Alpine plant zone occurs at the highest elevations where forests are located. These lands have potentials for use as forest-range provided grazing is carefully limited, especially in the case of goats. Ranges in the Mountain Region offer grazing to cattle, sheep and goats, the forage from native plant species which provide the bulk of total animal feed requirements. However, residues from harvested crops serve to round out total feed requirements in summer and early fall. Livestock from adjacent regions may be moved into the Mountains, while those quartered in the region, mostly in small village flocks and herds, seldom are moved out of the region.

Although the range in this regions has been heavily grazed, the higher rainfall and the presence of palatable perennial grass, shrubs and forbs indicates a possible rapid vegetative response and increased carrying capacities with the initiation of improved range management practices.

Rangelands in this region also serve as watersheds for the Coastal Region's water supply which will be affected by the level of management received in grazing uses.

Forestry Resources

The 172,000 hectares of land as estimated from the land use/cover information makes up over 17 percent of the Mountain Region. The Cedar and Alpine Plant zone occurs at the higher elevations and rainfall areas. Natural forests occur north and east of Lattakia in the vicinity of Kassab, Forluq and Slunfye.

The Kassab natural forest of Pinus brutia is a highly prized resource. Potential for this forest in meeting the needs of the people include water, recreation, wood for fuel, lumber, paper and naval stores. The general condition of the Kassab forest is poor and a large part needs timberstand improvement. Many of the trees are small, crooked or too closely spaced. In some areas it seems feasible to initiate a complete harvest of existigg stands, replacing them with genetically superior seedlings which would grow faster and produce more desirable trees when mature.

Near El Foruluq there are some good Pinus brutia stands and small areas of deciduous species including Alnus orientalis and Quercus sidocerris, which are dominant trees of about 25m in height. Quercus infectoria and two species of Sorbus occur in the understory. This is a highly used recreational area, although pressures from people and their vehicles are having a deliterious effect on this forested area.

The Slunfye forest near the top of Jeber el Ansariye contains many species not adapted to lower elevations. Quercus cerris of rather poor form is predominant below the mixed conifer - deciduous stands. Higher on the mountains are found the famous Cedrus lebani and Abies cilicica, Ostraya carpinifolia and other species. Due to the high elevations, steep slopes and thin soil, this is a fragile environment which is not adapted to commercial exploitation, widespread human use, or grazing.

The natural forests are capable of producing pine lumber, poles and pulpwood. With proper management oak lumber could be provided for the furniture industry. Under careful management these uses should be compatible with other functions of forests such as watershed protection and recreation.

However, the forest are being misused by unmanaged grazing and suffer from the problems created by fire, while the worst offender is agricultural encroachment.

Fisheries Resources

Fisheries resources in this region are largely undeveloped but there are plans for development of the lakes east of Lattakia to include fishing.

Crop Suitability Ratings

Analysis of the climatic, physiographic and soil characteristics together with plant requirements revealed a low medium to low potential for most rainfed crops on the terraced areas. Rosaceous and non-rosaceous trees might be grown on other areas where slopes are less steep. However, application of intensive management practices should be applied generally to control erosion.

Considering the low to very low inherent productive capacities and the generally severe to high susceptibility to erosion the most intensive use for the region as a whole, except where terraced, is generally woodland.

Crop Production and Present Land Use

According to land cover/use information 267,000 ha of land are used for extensive agriculture, 83,000 for orchards, and 34,000 for intensive agriculture (Table II-1).

Crop suitability ratings indicate that of the 350,000 ha of land now in orchards or extensive use, 4,000 have a high potential for continued extensive use, 80,000 have medium potential and 248,000 have only low potential. The 34,000 hectares now in intensive agriculture expected to remain in this use with a high crop production potential. Most of the cultivated land is terraced. However, because of the low inherent productivity of the region, further terracing does not appear justified and woodland development appears to be the most suitable means of controlling erosion.

E. Lowlands Region

General Description

Included in the Lowlands Type of Farming Region are 561,000 ha, amounting to only three percent of the total land area of Syria (Table II-1). The region, is composed of level limestone plains, level to undulating flood plains and terraces of the Orontes River (Ghab Valley), valleys of the A'farin River and its tributary valleys, and level coastal plains and hilly segments to the north of the Coastal Region. The region is bordered generally by the Mountain Region to the west and the Undulating Plains Region to the east - a warm temperate, Mediterranean climate prevails over the region.

On the basis of the land cover/use information interpretations 57 percent was classed as being in extensive agriculture, 25 percent in intensive and 8 percent in orchards. Other uses include about 9 percent in range, almost five percent in forest, and the remaining one percent in water or urban development.

Climatic - Physiographic - Soil Characteristics

The Lowlands Region is composed of RPUs 26, 34, 35, and 47. RPUs 26 and 34 have two PPAs each, RPU 35 has three, and RPU 47 one PPA (Appendix Table II-1). RPU 26 is broken into three segments and RPU 34 into two segments.

Elevations in the region range from 0-50m and up to 260m in the segment north of the Coastal Region, from 150-200mm in the Ghab Valley and from 200-500m elsewhere. Slopes amount to only 0-3 percent over most of the region, but range from 15-35 percent in the segment where the Lowland and Mountain Regions merge.

Precipitation on an annual average basis varied within the region from 750-1000mm in the segment north of the Coastal Region, to 300-750mm in the Ghab Valley. The wet season lasts from October through April nearer the Coast and from November through April elsewhere. Average monthly temperature during the wet season range from 7-11°C over most of the region, rising to 13-16°C nearer the Coast.

Soils are generally deep, reddish brown to dark fine to moderately fine textured. Most of the region's soil are hard clays, which crack when dry and which are sticky and plastic when wet. Permeability ratings are generally moderate to slow, while available water capacities are low to moderate over most of the region. The soil is considered to be moderate to well drained.

Water Resources

The Lowlands Region is contained within three hydrologic units. The Orontes Units (N) includes 53 percent of the region's 560,700 hectares, the Kwaik unit (B) 40 percent, and the Coast unit (O) seven percent, (Fig. II-4).

In the middle sections of the region lie the Asharneh Plain and Ghab Valley which are among the major irrigated areas of Syria. Lying in the Orontes hydrologic unit, the Orontes River is the major source of water by surface and return flows. A gauging station at the lower end of the valley recorded 1,009 million m^3 , representing also a quantity of water flowing into the sea. Two irrigation networks, Ghab (50,000 hectares) and Asharek (20,000 hectares) are located here.

Near the Homs-Hama segment of the region, also in the Orontes hydrologic units, are six reservoirs with a total capacity of 278.6 million m^3 . Al-Rastan and Mahardah, with a combined storage of 275 million m^3 are the main reservoirs. The large dam Kremish, with a capacity of 275 million m^3 is proposed for construction on the Orontes between Homs and Hama, which would add 28-30,000 hectares of irrigated land.

In the Coast hydrologic unit, the west central part of the region, is a network for irrigating 13,000 hectares. Also a dam is proposed on the Al-Kabir al-Shamali River to store 214 million m^3 and supply water to irrigate 14,000 hectares. Seven reservoirs in this segment have a total capacity of 18.6 million m^3 . Two small reservoirs, scheduled for completion in 1981, are expected to hold 1.3 million m^3 .

In the north of the Lowlands, also in the Orontes hydrologic unit, the Afrin River at the lower station recorded an annual flow of almost 146 million m^3 , an amount which could irrigate about 2,000 hectares. A proposed irrigation development near Medant could store 230 million m^3 and irrigate 20,000 hectares of land.

Springs have been gauged over much of the region. The large Chizer springs located below Maharadah has an annual flow of 6,424 l/sec. or 202 million m^3 . Some 22 other springs scattered throughout the region, have been gauged at average flows of between 64 l/sec. and 7,918 l/sec.

While no test wells are reported in the far north of the region, about 85 wells have been tested elsewhere in all hydrologic units. Wells depths range from 12 to 350 m, with average yields of between .8-26.9 m^3 /hr.

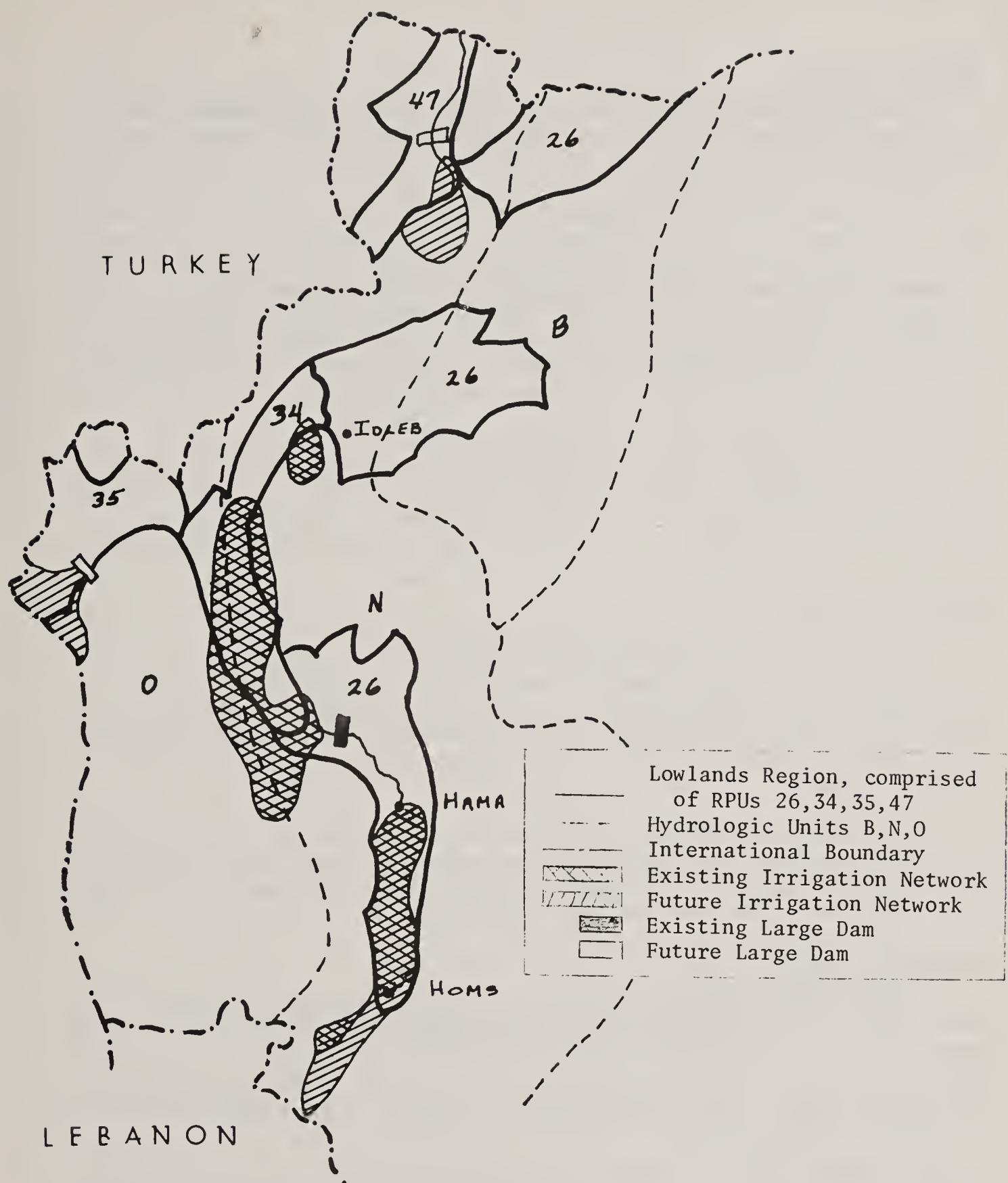


Figure II-4. Resource Planning Units, Hydrologic Units and Irrigation Facilities - Lowlands Region.

Range Resources

Land cover/use information for the Lowlands Region indicates an estimated 51,000 hectares of land classed as range, only slightly more than nine percent of the total land area in the region.

Vegetation of the West Syrian plant zone occurs in the non-cultivated areas over most of the region except for the segment north of the Coastal Region where plants of the Mediterranean plant zone are prevalent. Many villagers own livestock, including cattle, sheep and goats that graze on the range found largely in the the foothill segments of the region. Few of the livestock are moved out of the region for grazing except those moved into the bordering Mountain Region. Livestock graze on some crops prior to harvest and also on harvested crop aftermath.

Heavy concentration of livestock on rangeland has resulted in a reduction of the more nutritious, palatable forage species and a lowering of carrying capacity. The occurrence of range in small scattered segments, and the use these tracts by livestock belonging to many owners lead to difficulties in managing the resource to maintain or improve range conditions.

Forestry Resources

Fingers of hills extending into the region are classed as forest on the basis of the Landsat imagery. Most of this land is intermingled with range with almost 70 percent of the forest land located in RPU 35. Low growing deciduous trees and underbrush populate most of the forested area, which, because of grazing and cutting over the years is in a degraded condition.

Opportunities exist to improve the stands on some of these lands, although the potentials for growing merchantable timber are quite limited. Recreational use of some of these forested areas could be enhanced but grazing use would need careful management.

Fisheries Resources

Considerable potentials exist in the Lowlands Region for warm water fish farms. At El Ghab the fishery development program includes two fish farms. The Ain Tafa Farm produces mirror carp and talapia with a planned production of 238.5 tons per year from 440,000 six-month and 920,000 one year all carp. There are 36 ponds of 25m² size each and four spawning and holding ponds.

The Shatha Farm in El-Ghab produces common carp, grass carp and tiliapia for consumption and fingerlings for sale. There are 27 ponds of two hectares each for production, 11 ponds of one-half hectare each for fingerling production. In addition, there are 27 holding ponds of 120m² each and three other ponds ranging from 400m² to 8500m² in size. Actual production amounted to 146 tons and 666,000 fingerling carp in

1978. Plans were to produce 252 tons including 800,000 carp fingerlings in 1979. Ponds appear to be shallower than required for optimum fish production and filling of the ponds appears to be impeded. Excessive seepage occurs in some ponds and excessive growth of reeds and other plants also inhibit use. Supplies of quality feeds appear to be inadequate particularly fresh green grass, barley or other similar crops.

The Roog Farm producers grass carp and tilapia. There are 12 ponds for producing fish for consumption with total area of 5.4 hectares and a depth of 150-175cm. Twelve ponds of 3500m² each have been constructed for fingerlings. In addition, there are 18 hatchery ponds 200-300m² each and four concrete holding of ponds 200m² each. Recent annual production amounted to 53 tons of carp for consumption, 42.5 tons of carp fingerlings, while all tilapia died due to cold weather.

Another fish farm to be located at Kalaath el Moudik has not been completed.

Crop Suitability Ratings

The soils of the Lowlands Region characterized by moderate to high inherent productive capacity and generally low to very low susceptibility to erosion, have medium to high potentials for producing most rain-fed and irrigated crops (Appendix Table II-3 and 4). Only the hilly segment of 33,900 hectares north of the Coastal Region is considered to have no crop potentials. Because of soil erosion hazards, the most intensive use recommended for this area is for pasture or range.

Small grains have the most widespread suitability with potential ranging from medium under rainfed conditions to high if irrigated. Pulses have medium to high potentials in all segments except the segment north of the Coast. Cotton has a medium potential in the Ghab segment and a high potential in the far north. Potentials for vegetable crops are medium in the Ghab and in the relatively level areas of the northwest. Tuber crops have a medium potential in the Ghab and vicinity, while oil crops have medium or high potentials in the northern parts of the region. Also tree crops, except citrus have medium to high potentials in the central segments of the region and north of the Coast. Olives have widespread suitability.

Crop potentials for the crops mentioned above increase under irrigation generally from medium to high, following approximately the same patterns of suitability ratings. Under irrigation, most of the areas has potential for producing cotton, vegetables, tuber crops, and rosaceous and non-rosaceous tree crops.

Crop Production Potentials and Present Land Use

With 560,000 hectares of total land in the Lowlands, 291,000 hectares is in extensive agriculture, 140,000 hectares in intensive agriculture, 45,000 hectares in orchards, with the remaining 85,000 in other uses, range and forest primarily.

The 140,000 hectares now in intensive use have medium to high potential for irrigation and would be expected to remain in this use. Of the 336,000 hectares in extensive agriculture or orchards, 322,000 hectares have a medium to high potential for rainfed crop production and should be retained in that use. The remaining 14,000 hectares is composed of steeply sloping hill lands with severe erosion susceptibility in RPU 35 and should be shifted to forest use. Of the 85,000 hectares in other uses, 57,000 has a medium to high potential for rainfed crop production. This land, scattered throughout the region, should be developed for more intensive use. The remaining 34,000 hectares in other uses should be retained in that use.

F. Undulating Plains Region

General Description

With an estimated land area of 2,273,000 hectares, the Undulating Plains Type of Farming Region makes up over 12 percent of the land area of Syria. The topography is generally level to gently rolling. The northern segment of the region lies on either side of the Euphrates River, extending eastward to Aleppo and south to Hama and Homs (Fig. II-1). The climate is temperate and characteristic of the Mediterranean.

Almost 58 percent of the land area in the Undulating Plains is in extensive agricultural use, four percent in intensive agriculture, less than one percent in orchards, and about 37 percent in ranges or other uses. Over 26 percent of the Nation's total land in extensive agriculture and 12 percent in intensive agriculture is contained in this region.

Climatic - Physiographic - Soil Characteristics

Nine RPUs, subdivided into 23 PPAs lie within the Undulating Plains Region (Appendix Table II-1). Elevations are quite uniform, the extremes ranging from 250m along the western segment to 600m in the east and north. Slopes of 0-8 percent occur over most of the region although segments near the Mountain Region to the west and a segment in the north have slopes of 3-15 percent.

Average annual precipitation, generally falling between November or December through April or May, varies considerably over the region. Around 200-300mm occur annually on the average in the southeastern and east central portions of the region. From 300-500mm appear to be

common over most of the remainder of the region, particularly segments where gaps in the mountains to the west allow rain-bearing cloud formations to pass over. Up to 500-1500mm of precipitation occur in the segments near the Coastal and Mountain regions in the south. Monthly temperatures during the wet season average 11-12°C near the Coastal and slightly higher in the north near the Euphrates, with 7-10°C generally occurring elsewhere in the region.

Soils formed from limestone on level, rolling and undulating plains make up the largest part of the region, although in the eastern portion soils from basalt on undulating plains also occur. Soil depth to bedrock are generally greater than one meter in the south-east and east-central segments. The shallower soils, those from 10-50cm in depth, occur in the north on either side of the Euphrates. Soil textures are fine to medium and permeability slow to moderately slow. Available water capacities are low to moderate. Soils are well drained, although some areas of poor drainage occur in the south-east segment of the region.

Water Resources

Four hydrologic units encompass extensive land areas of the Undulating Plain Region, while three units include only small segment of the expansive region, (Fig. II-5). The Jesireh hydrologic unit (A) in the northeast includes the land area near the Euphrates and includes one-third of the region. The Orontes unit (N) comprises almost one-third of the region to the southwest and includes the segment near Homs and Hama to the south of Idleb. About 13 percent of the region, the segment near Aleppo, is part of the Kwaik hydrologic unit (B) while the Jabboul unit (C) to the northwest includes almost 14 percent of the region. The Kanasser unit (F) includes a segment amounting to seven percent of the region northeast of Hama, while the Al-Daw (D) in the southeast and Coastal unit (O) in the southwest includes less than one percent of the region.

An irrigation network is proposed for the Orontes unit near Homs while segments in the northeast are part of the Bailkh and Meskeneh Units of the Euphrates Project in the Jabboul hydrologic unit, with some 17,000 hectares reportedly irrigated.

Nine reservoirs are in the area immediately west of Homs in the Orontes unit, the total capacity estimated at 224 million m³ of which 200 million m³ is in the Qattineh reservoir. The Meskeneh reservoir of one million m³ also is near Homs. All are used for irrigation between Homs and Hama. Two other reservoirs in the Orontes Unit, with a total capacity of 6.5 million m³ are used for domestic water, while another one of 3.5 million m³, for the same purpose is located in the Jabboul Unit. Domestic water for Aleppo is obtained from the Euphrates River and Lake Al-Assad. Two reservoirs for domestic use northeast of

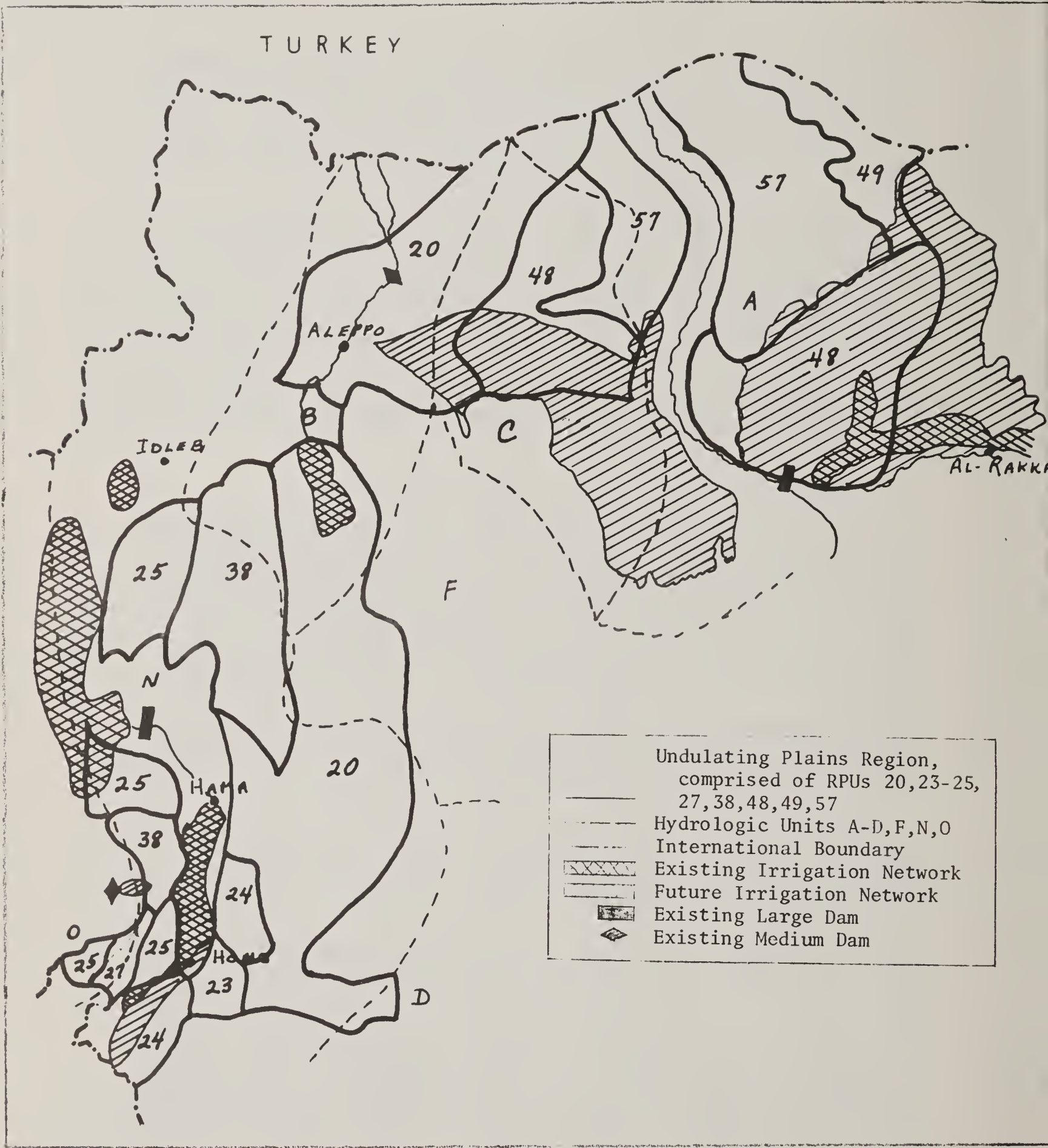


Figure II-5. Resource Planning Units, Hydrologic Units and Irrigation Facilities - Undulating Plains Region.

Hama have a capacity of 651,000 m³, although no storage was reported in 1978.

A reservoir for domestic use north of Al-Rakka in the Jabboul unit has a capacity of 620 thousand m³. Also in this hydrologic unit, a small reservoir with a capacity of 2 million m³ is planned for irrigation.

Four springs in the Orontes unit to the southwest have annual flows of 2,255 l/sec, while three other springs have been gauged at an average annual flow of 182 million m³. Another spring has an average flow of 850 l/sec throughout the year. The Sajoune River in the north segment of the region leading to the Euphrates has an annual flow of 88 million m³.

Test wells in the Jabboul hydrologic unit in the north ranged in depth from 75m to over 300m with water yields of from 8.1m³/hr. to 40.0m³/hr. In the Orontes hydrologic unit in the south and west segments of the region were wells that ranged from 96 to 555m in depth and yielded from .3m³/hr. to 19.1m³/hr.

Range Resources

Range, totalling 851,000 hectares in the Undulating Plains Region, accounting for over 37 percent of the region's total land area and for almost seven percent of the total range in Syria. Plants of the East Syria zone populate the largest parts of the western portion of region while plants of the Steppic Zone occur in the far eastern and north-eastern segments.

Awassi sheep, Syrian mountain goats, some in mixed flocks, and some cattle graze the ranges of the region during the autumn through spring period. Forage grazed from the range by local village flocks in this region is heavily supplemented by wheat and barley residues. In addition flocks of sheep are moved from other regions into the Undulating Plains for crop stubble grazing. At the same time flocks belonging to villages in the regions are moved in December-February to the Steppe for grazing, returning to the region in May-June.

The occurrence of range in scattered tracts, the intermingling of cropland and range, and the periodic plowing of range in the lowest rainfall areas for crop production make sound range management difficult.

As a result, ranges of the Undulating Plains Region have been severely overgrazed and the native plant cover in some areas only marginally suited for farming has been destroyed. The opportunities for improving ranges of the region are quite high technically, although coordinated grazing management plans for particular range areas would be a prerequisite.

Forestry Resources

Less than one thousand hectares of forest land have been identified through Landsat imagery interpretations. Pressure for cropland and grazing uses of the land resources preclude the development of forests in the region. However, the planting of trees as shelter belts in the rural areas and greenbelts in urban centers have some potential, mainly for aesthetic purposes.

Fisheries Resources

Lake Qattineh west of³ Homs is the primary fisheries resource in the region. The 200 million m³ lake covers an area of 6,000 hectares to a depth of six to seven meters. Production of fish, carp and tilapia, is reported to be low at an estimated 650 metric tons in 1978.

The low production may be a result of the mill dam 15 km upstream, which hinders fish leaving the lake to spawn at favored sites further up the Orontes river. Another factor may be the netting for fish during spawning runs in the masonry channels below the mill dam. In 1973 the Ministry of Agriculture and Agrarian Reform placed the lake under its jurisdiction for management and control of fishing. The arrangement provided for licensing of fishermen, the catch to be divided between fishermen and MAAR. However, this attempt was unsuccessful and some 200 part-time fishermen from 16 villages continue to fish free of charge from the lake.

Crop Suitability Ratings

Inherent productive capacities of the soils of the Undulating Plains Region are generally mixed, tending toward moderate to high, although substantial areas of soils with low productive capacities occur along the western and northwestern segments and isolated areas of the region, (Appendix Table II-3). Low to moderate susceptibility to erosion characterizes most of the soils, while moderate to severe susceptibilities occur among soils in the north on either side of the Euphrates.

Indications are that crop suitability is generally moderate under rainfed conditions in the western portions of the region. Segments along the western side of the region adjoining the Lowlands have high rainfed potentials, most crops have potentials with the exception of citrus. Limited rainfall in the 250-300mm range along the eastern and parts of the result in only low potentials for production of most all crops with the exception of small grains. Low rainfed crop production potentials also exist in some segments in the north and on either side of the Euphrates, although by breaking hard petrocalcic layers moderate potentials for production of small grains and oil crops may be realized. Other segments have no potentials for rainfed farming and, without irrigation, are better suited for range use.

Under irrigation most of the region has medium to high suitabilities for production of most crops. Shallow soils and moderate susceptibilities to erosion limit the potentials for irrigated crops in some segments, but with the breaking up of impervious layers in the northeast segment medium to high potentials for irrigated crops may be achieved.

Crop Production Potentials and Present Land Use

Current land cover/use estimates indicate that 1.3 million hectares or almost 58 percent of the total land area, are used for extensive agriculture, while only 4,000 hectares for orchards (Table II-1). Intensive agriculture use includes almost 86,000 hectares, accounting for almost four percent of the total land area of the region. Except for the area of urban development, the remainder is in range.

Crop suitability ratings, based on land resource and plant adaptability characteristics indicate some 829,000 hectares are suitable for remaining in rainfed agriculture. However, 142,000 hectares of this land in the lower rainfall area have only low crop production potentials. At the same time there are 462,000 hectares of land now in extensive use which should be retired from rainfed farming and placed in other uses such as range. Another 28,000 hectares now in other uses could be shifted to rainfed crop production. As a result of these shifts expectations are that 90,000 hectares of extensively used croplands would have high crop production potentials, 625,000 medium, and 84,000 low potentials.

The 87,000 hectares of land now in intensive use would be expected to remain in irrigated agriculture, while 19,000 hectares now in extensive use and 35,000 hectares now in other uses could be brought under irrigation. As a result 70,000 hectares would be suitable for intensive agriculture with high potentials for irrigated crops, while 71,000 hectares would be suitable for medium potentials for irrigated crops.

The 876,000 hectares land now in other uses would be increased to almost 1.3 million hectares if the land is to be used for its most suitable purposes.

G. Euphrates and Tributaries

General Description

The Euphrates and Tributaries Type of Farming Region includes some 725,000 hectares of land which comprise about four percent of the land area of Syria (Table II-1). Included mainly are the flood plains and terraces bordering the Euphrates River and its tributaries, the Belikh and Kabur.

The land cover/use information indicates that almost 202,000 hectares of land in intensive use, making up almost 28 percent of the region's total land area. Slightly less than 185,000 hectares are in extensive use, or almost 26 percent of the total land area. Other land totaling 339,000 hectares includes approximately 280,000 acres in range which accounts for over 38 percent of the region's total and 59,000 hectares in water or urban development which account for 8 percent of the total.

Climatic - Physiographic - Soil Characteristics

Three RPU's divided in 8 PPAs make up the Euphrates and Tributaries Region (Appendix Table II-1). RPU demarcated on maps and described include 32,40 and 42 (Fig. II-6).

In the region are found soils from alluvium on level plains, soils from unconsolidated materials on level to undulating plains, soils from weakly consolidated sedimentary rocks on undulating plains, and gypsiferous soils overlying weakly consolidated materials.

Elevations of the region range from 175 - 400m, while dominant slopes range from 0-3 percent over the bulk of the region and up to 8 percent along the valley borders. Average annual precipitation generally is less than 300mm except in the higher reaches of the Euphrates and Belikh rivers, where averages of 300-500mm occur. The wet season, usually lasts from October through May. Average monthly temperatures during the wet season, uniform throughout the region, range from 13-16°C.

Soils are deep over the region, more than one meter to bedrock, with soils textures varying from fine to coarse. As a result permeabilities are moderate to slow in the fine textured soils and rapid in the coarse textured soils. Available water capacities are low in the coarse, more rapidly permeable soils and moderate in the finer textured soils. Fine textured soils in the region are moderate to moderately well drained, while coarser soils are excessively drained. The gypsiferous soils, particularly in RPU 42, are subject to subsidence creating serious problems in long-term irrigated production.

Water Resources

The Jesireh hydrologic unit encompasses 94 percent of the Euphrates and Tributaries Region, while the Jabboul includes only six percent (Fig. II-1). According to Landsat imagery some 58,000 hectares are made up of surface water, largely that contained in Lake Al-Assad.

Lake Al-Assad, with a capacity near 12 billion m³, is expected to furnish irrigation water sufficient for 640,000 hectares when the canals are completed and the land is shaped and conditioned for irrigated farming. Not all of this land lies within the region, for part is located nearby in what has been classified as the Steppe Region. In addition to irrigation and domestic water uses this large dam in the Euphrates serves

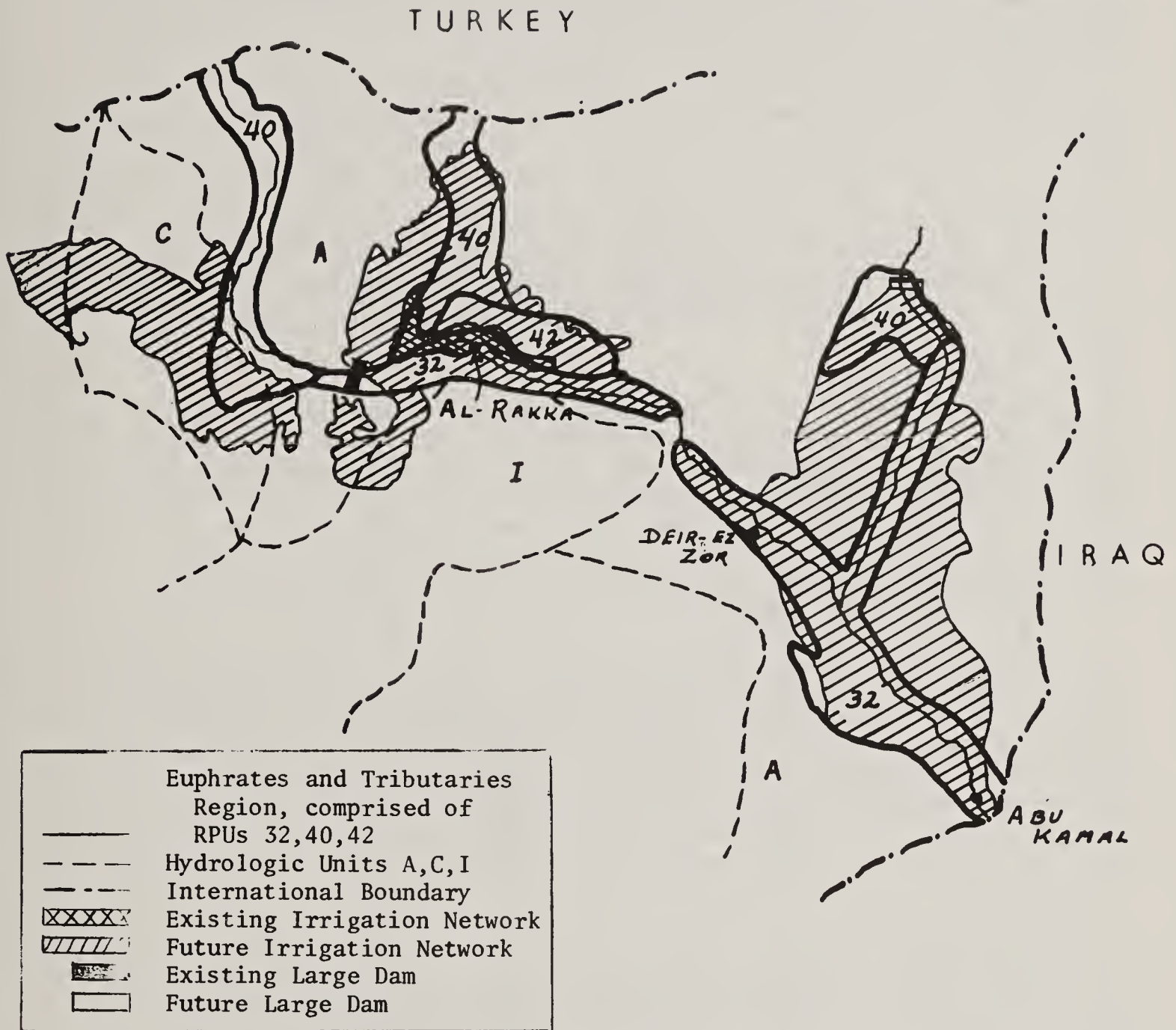


Figure II-6. Resource Planning Units, Hydrologic Units and Irrigation Facilities - Euphrates and Tributaries Region.

to control floods, generate substantial amounts of hydroelectric power, and service water needs for water-using industries such as sugar plants, pulp mills and cotton cloth plants.

Studies have been made of two storage reservoirs on the Upper Khabour with capacities of 600 million m³ and 320 million m³ of water, which could irrigate most of the suitable land in that part of the region. The Belikh River has an annual flow of around 190 million m³.

Up to 40 percent of the currently irrigated land along the Euphrates and Upper Khabour is irrigated by pumping from rivers. Pumped water from the Belikh River also is used for irrigation. The Euphrates Pilot Project is now largely irrigated by pumped water from the Euphrates.

Range Resources

Plants typical of the Steppic plant zone are found on the most of the 280,000 hectares of range in the Euphrates and Tributaries Region. In the northeast segment may be found plants of the West Syrian plant zone. Sheep in village flocks along the river and in the flocks belonging to semi-nomadic tribes graze the range of the region from December-February until May-June. Crop aftermath harvest, including small grain and cotton, provides perhaps as much as half of the total feed requirements of the sheep.

Uncontrolled grazing, both in respect to numbers of sheep grazing and the length of time grazed, has been the norm for a considerable period of years. As a result, the range has deteriorated to the point that unpalatable shrubs and annual grasses predominate. Although a number of range and sheep cooperatives have been established for the purpose of demarkating grazing areas and balancing stocking rate in accordance with range conditions, evidence indicates that much remains to be done to prevent range conditions in the region from deteriorating further.

Forestry Resources

The Euphrates and Tributaries Region, while not a forest environment in any sense, has certain potentials for wood product production from irrigated poplar trees. The native species Populus euphraticus has been growing naturally in the Euphrates river valley where it serves some useful purposes, but it has little value compared to the rapidly growing introduced species which have excellent form. However, the native species is more salt tolerant than are the introduced species.

At Al-Thawra there are now 800 hectares of populus plantations for producing wood products under irrigation the plan is to increase plantings at the rate of 280 hectares annually. Part of the project involves testing of new species, determining fertilization practices for

optimum growth and control of damaging insects. While the products produced could include matches, plywood and particleboard, the more immediate possibility appears to be pulpwood for paper. The success of the project, while dependent upon the experimental results obtained, is also dependent upon modification of the paper mill at Deir-ez-zor to handle wood instead of straw.

Fisheries Resources

The major fisheries resource is Lake Al-Assad, created by the dam on the Euphrates River at Al Thawra, which has an area of 64,000 hectares with depths of up to 45m at the dam. Here, a team of experts is developing a project concerned with limnology, assessment of productivity of the lake, fish population assessment, and small scale net cage culture of rainbow trout and carp.

Indications are that following the initial several years of relatively high fertility and rapid fish growth following impoundment of water, Lake Al Assad has declined to relatively low fertility levels. This decline has resulted from insufficient phosphorous and the formation of hydrogen sulfide in the bottom mud.

The main problem at present is that the fish population consists primarily of small cyprinidae which are undesirable as a food fish. An effort is being made to establish a predator species, such as Esox lucius (pike) to feed on the undesirable species and to grow into a food fish itself. The likelihood for successful introduction of this species in suitable numbers, harvest, appears doubtful. If pike do not survive perhaps native species such as Siluris and one of Barbus species could be tried. In either case, some additional years will be required before the potential for food fish production is realized.

The net cage culture of rainbow trout and carp appears to be quite successful and warrants larger scale development. Capital investment costs are relatively modest, as compared with fish farms construction. However all food must be brought to the fish, as the quantity available from natural organism is usually negligible under cage culture conditions.

Crop Suitability Ratings

Inherent medium to high productive capacities and rather low susceptibility to erosion characterize the soils of the Euphrates and Tributaries Region (Appendix Table II-3). However, low average annual rainfall patterns place a restriction upon rainfed crop production potentials over most of the land area. The remaining area is considered to have only low potentials for rainfed production of small grains.

Under irrigation the region generally has medium to high potentials for most crops, including small grains, cotton, pulses, vegetables, tuber and bulb crops, and rosaceous tree crops (Appendix Table II-4). However, careful management would be required in some segments to prevent build-up of toxic levels of salinity, while in other segments extensive soil modification would be required. Only a segment near the joining of the Belikh and the Euphrates, about eight percent of the region's total land area, appears to have no potential for irrigated crop production.

Crop Production Potentials and Present Land Use

Provided careful management to prevent salinity build-up and extensive soil modifications are applied, the 202,000 hectares now in intensive use would be suitable for remaining in irrigated crop production. The 184,000 hectares now in extensive use could remain in rainfed farming, although as mentioned the crop production potentials are low. This land now in extensive rainfed crop plus 280,000 hectares of land now in other uses has medium to high potentials for irrigated crop production. About 59,000 hectares of land in other uses is not suitable for crop production.

H. Northeast Region

General Description

The Northeast Type of Farming Region's 2,496,000 hectares, accounting for over 13 percent of the total land area of Syria, is the second largest of the eight regions. Included is the Jesireh and the areas to the north and east to the borders of Turkey and Iraq.

According to interpretations of Landsat imagery 1,935,000 hectares of land or 78 percent of the total of the region is in extensive agriculture, while almost 54,000 hectares or two percent is in intensive use, (Table II-1). Almost 503,000 hectares of land or 20 percent of the total land area is currently in range.

Climatic - Physiographic - Soil Characteristics

Eleven RPUs, including 26 PPAs make up the Northeast Region (Appendix Table II-1). Most of the region has been formed from weakly consolidated sedimentary rocks on rolling and undulating plains, from basalt or marl on rolling plains, or from limestone on steeply sloping hills and escarpments.

Elevations range generally from 300-500m over most of the region, rising to 700m in the far northeast and 1,000m among isolated mountains in the west central segment. Dominant slopes generally are 0-8 percent but slopes ranging from 8 to 35 percent also occur.

Average annual rainfall varies considerably over the region, ranging from less than 250mm in southern segments next to the Steppe to 500-750mm in the northeastern segments. The wet season lasts from November-December through April-May over most of the region. Monthly temperatures during the wet season average around 11-12°C for most of the area but are slightly colder in some segments.

Soils are generally deep over most of the region ranging from one to 1.5m except in the low hills and mountains, where 25-50cm depths occur. Moderately coarse soils occur broadly in the southern and central segments, changing to medium to fine toward the northcentral and northeast segments. Soil permeability ratings generally are moderate except for slow permeabilities occurring in locations of fine textured soils. Available water capacities vary from very low in locations of the coarse textured soils, to low in areas of fine textured soils, and to moderate capacities in other locations. Most all soils are moderately well to well drained.

Water Resources

The entire Northeast Region lies in the Jesireh hydrologic unit, (Fig. II-7). The Upper Khābour River gauge annual flows averaging from 1.4 to 1.6 million m³ and is the source for an irrigation network serving some 60,000 hectares located in the central to northeastern segments of the region. Another irrigation network located in the northeast segment of the region consists of two reservoirs with a combined capacity of 31 million m³ of water for irrigating 3,000 hectares of land.

Other reservoirs in the region include a 440,000m³ reservoir south of Al-Hasakeh, which stored no water in 1978 and two reservoirs under construction with a combined capacity of over 21 million m³, both located in the northcentral segment. Planned for construction on a small tributary to the Tigris River in the northeast segment are two reservoirs with a combined capacity of 8.5 million m³. Reportedly, pumping occurs for irrigation from the Tigris River in the northeast segment but details are not available.

A number of test wells have been drilled in the region. Some 17 wells in the northeast segment, drilled to depths averaging from 126 to 158m, yielded averages of from 17.1 to 26.4m³/hr. In the northwest segment seven test wells were drilled to an average of 163m deep with water yields averaging 64.9m³/hr. Water yields averaging from 15.2 to 26.1m³/hr were obtained from 19 test wells in the central segment of the region, while two test wells in the northcentral segment averaged 326m in depth and yielded 58.1m³/hr.

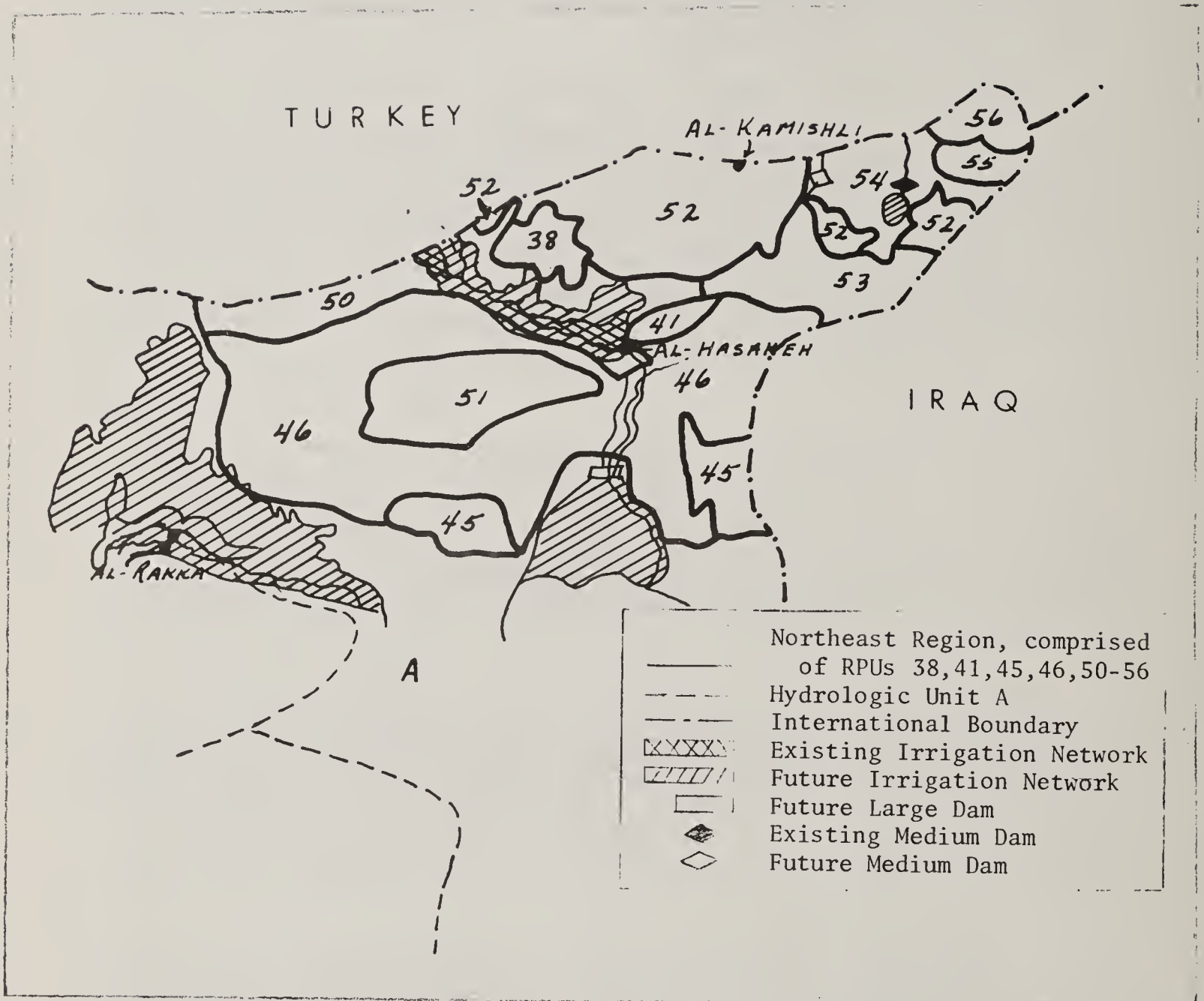


Figure II-7. Resource Planning Units, Hydrologic Units and Irrigation Facilities - Northeast Region.

Range Resources

Range, totalling almost 503,000 hectares makes up over 20 percent of the Northeast's total land area, but only four percent of the national total area of range. In the northeast segment of the region, where higher rainfall occurs, vegetation of the Northeastern, Northern and Southern Syrian Continental plant zones predominant on ranges. Range of the remainder of the region to the south and west is populated by vegetation of the Steppic plant zone. These lands, used for grazing, also serve to protect watersheds of the region.

Sheep-raising is the primary livestock enterprise on ranges of the Northeast Region. Many flocks are grazed here under the control of villagers, while other grazing in the region is controlled by migratory herders. Grazing periods on the range usually lasts from December-February until May-June at which time the flocks are moved onto crop residues in the region's cultivated fields following harvest, and onto vegetative growth occurring on fallowed lands. Some flocks quartered within the region are moved to the Steppe when grazing is available there while flocks from other regions are moved onto the crop residues and fallowed lands in the northeast when grazing is available. Indications are that up to as much as one-half of the feed consumed by sheep comes from residues and vegetative growth from fallowed fields.

Excessive grazing of the region's ranges has resulted in an increase of the less palatable forage and browse species, reduced overall plant cover, and exposed much of this land to erosion. In addition, some land better suited for use as range because of limited rainfall has been cultivated periodically and the natural vegetation destroyed. Digging of shrubs for fuel also depletes the range of a valuable grazing asset and results in further range deterioration.

Without integrated plans for classifying, demarcating and managing the ranges for protection and improvement, it is unlikely that these lands will be maintained even at current levels of production nor be able to provide the cover for needed protection of watersheds.

Forestry Resources

According to Landsat imagery interpretation no forest land appears in the Northeast Region nor do the nature of the resources indicate a potential for forest production.

Fisheries Resources

While existing reservoirs in the Northeast Region may offer potentials for fish production, no programs are known to exist and no assessment has been made.

Crop Suitability Ratings

Generally soils in the northern portion of the region have moderate to high inherent productive capacities while in large segment of the south the capacities are low to medium, (Appendix Table II-3). Susceptibilities of soils to erosion are variable over the region, changing from very low in the level sections of northeast to severe in the isolated mountains in the central segment.

The flatter lands of the northeast segment, although having high productive capacities and a low susceptibility to erosion have only low to moderate potentials for rainfed crop production, and would require soil drainage even if these potentials are to be reached. Small grains and oil crops would be the suitable crops. In other parts of the northeast, potentials for rainfed production of small grains, pulses, oil crops are medium to high. Lower average rainfall areas in the central to southern parts of the region are suitable for rainfed production of small grains although the potentials are low. Steep slopes and shallow soils restrict potentials for rainfed crop production in scattered segments of the region.

The characteristics described earlier, together with various crop suitability characteristics indicate generally high to moderate potentials for irrigated crop production, (Appendix Table II-4). In the segments of steep and shallow soils potentials are lacking. Also some areas in the northeast segment will need carefully managed drainage if the moderate crop production potentials is to be realized. The most widely suitable crops for the northeast segment under irrigation include small grains, vegetables, oil crops, olives, rosaceous and non-rosaceous tree crops, and in limited areas, cotton and pulses. In other segments to the south and west the suitable crops become less numerous and include small grains primarily.

I. Southwest Region

General Description

The Southwest Type of Farming Region, consisting of 1,391,000 hectares, accounts for over seven percent of the total land area of the Syrian Arab Republic. From the border of Syria and Lebanon, the Jabal Al Shaykh descends southeastward to the Horan plateau. This area receives rain-bearing winds from the Mediterranean Sea. Volcanic cones intersperse the open, rolling Horan plateau south of Damascus and east of the Anti-Lebanon Mountains. Southeast lies the high volcanic area of the Jebel Druze range. The climate is Mediterranean over most of the region.

Landsat information indicates that approximately 40 percent of the region's total land area is used for extensive agriculture, slightly less than five percent for intensive agriculture and almost three percent used for orchards. Over 45 percent of the region's total land area is range, while almost 7 percent is classed as barren land.

The Southwest is a relatively important rainfed agricultural region, for the 553,200 hectares used for extensive agriculture constitute 11 percent of the national total of land in this use. Almost 19 percent of the national total land area in orchards, some 35,500 hectares, are located in this region also. At the same time intensive agriculture, which is generally irrigated, amounts to 65,300 hectares and accounts for about 10 percent of the national land area total in this use.

Climatic - Physiographic - Soil Characteristics

Ten Resources Planning Units (RPU's) including 23 Production Potential Areas (PPAs) have been identified and described for agricultural planning purposes in the Southwest Region (Appendix Table II-1). While only the RPU's have been specifically delineated on maps, the descriptions of climatic physiographic and soil characteristics are presented by PPA within each RPU and the total land area of each estimated.

The southern part of the region, comprising some 70 percent of the region's total land area differs somewhat in characteristics from the remainder of the region. The southern segment includes RPU's 2,3,4,5,6 and 8. It consists of rolling plains with shallow to deep, generally fine textured soils overlying basalt. The soils are slowly to very slowly permeable for the most part, generally well drained, with low available water capacities.

Elevations in this southern segment of the region vary considerably, the lowest occurring in the south-central part of the region at 350m, and the highest ranging from 1200m in the northwest to 1600m in the southern and eastern parts. Slopes of 0-8 percent are found in the northeast, central and western parts of the segment, 8-15 percent at the edge of mountains in the southeast and west, and slopes greater than 25 percent in the mountains in the southwest.

Precipitation generally falling from November through April, averages from 500-1000mm annually in the higher elevations along the western side of the segment to 300-500mm in the higher elevations along the eastern side. Most of the remaining land in the segment lies at lower elevations where annual precipitation averages less than 300mm. Average monthly wet season temperatures range from 0-8°C in the high elevations along the western side of the segment to 12-14°C in the lower elevations in the northeast.

The remaining 30 percent of the region includes the northern segment composed of RPU's 9, 10, 15 and 16. Gently rolling plains and mountains in this part of the Southwest overlay limestone conglomerates or marls. Soils range from shallow to deep, medium to medium-fine textured, stony, and generally permeable and well drained. Water capacities are moderate to low.

Elevations range from 600m in the eastern part of the segment to 1900m in the northernmost part. Dominant slopes of 0-3 percent are found on lands scattered among mountaineous sections throughout the segment, while lands with slopes of 20 percent or more include the mountains in the northwestern and scattered mountains in the northeastern parts of the segment.

Precipitation, falling primarily from November through April, averages less than 268mm annually except in the northwestern section where averages of 300-700mm occur. Wet season temperatures range from 2-8°C at the higher elevations along the western side to 10-16°C at various elevations to the east.

For the region as a whole approximately 22 percent of the land area receives less than 250mm of precipitation annually, over 40 percent has soils less than 50cm in depth and almost 60 percent consists of land with dominant slopes exceeding eight percent.

Water Resources

The Southwest Region includes all of the Horan hydrologic unit (L) which consists of almost 814,000 hectares, located in the southern segment of the region (Fig. II-8). About 47 percent of the land in the Damascus hydrologic unit (M) lies in the region, the largest part of the 426,000 hectares located in the northern segment of the region. Some 6 percent of the Orontes hydrologic unit (N), or 101,000 hectares, dip into the northern segment of the region, while over 8 percent of the Al-Zalf hydrologic unit (G), or 50,000 hectares, are located in the southern segment. Landsat information indicates that 2,700 hectares of surface area is covered with water, with almost 60 percent located in the Damascus hydrologic unit in the northern segment and over one-third in the Horan hydrologic unit in the southern segment.

There are four major irrigation networks in the southern segment of the region lying in the Horan hydrologic unit. These networks are supplied by canals from springs and rivers, including the Yarmouk with an annual flow rate of 220.8 million m³, the A'waj with an annual flow rate of 157 million m³ and reservoirs with storage capacities totaling 84 million m³. These networks irrigate some 83,000 hectares. Six dams under construction, with combined storage capacities of 33 million m³, are expected to provide water to some 2400 hectares of additional land.

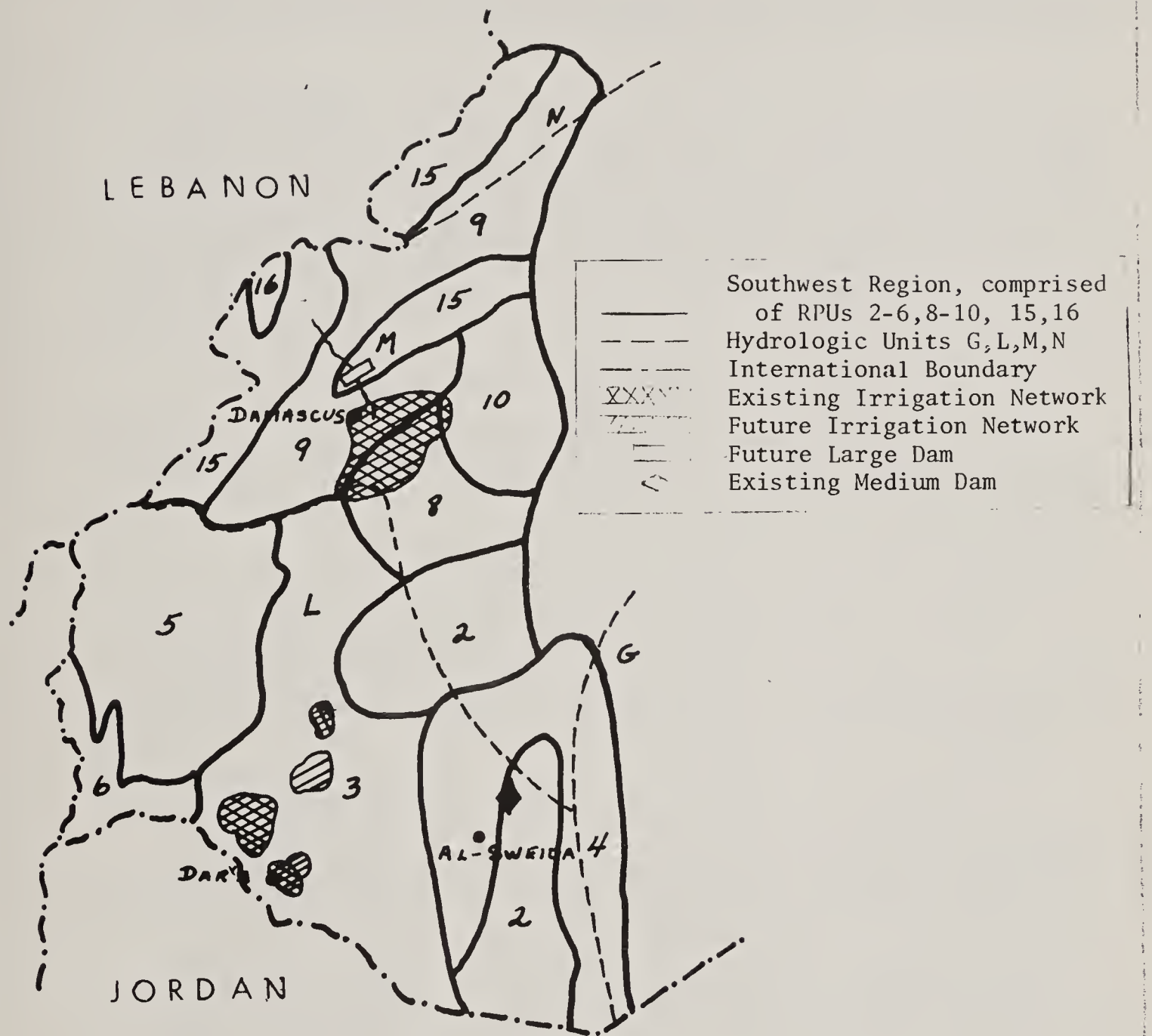


Figure II-8. Resource Planning Units, Hydrologic Units and Irrigation Facilities - Southwest Region.

Test wells drilled in the southern segment of the region number around 50, the average depths ranging from 128 to 302m and average water yields from 0.7 to 26.6m³/hr.

The major irrigation networks in the Northern segment of the region is the Ghouta in the Damascus unit with some 20,000 hectares of land under irrigation. A total of 48 canals are used to transport water from stream channels and springs, supplemented by wells which also provide water for irrigation. The Barada River, flowing at a rate of 250 million m³ annually provides water for domestic and industrial uses of Damascus totalling 94.5 million m³, part of which is recycled for irrigation purposes. Over 80 springs used for irrigation and other purposes have combined flow rates of 11,000 l/sec. A 1.7 million m³ reservoir is used for domestic water purposes, while a 1.5 million m³ reservoir is under construction for irrigation.

About 35 test wells have been drilled in this segment of the region at depths of 122 to 276m. Water yields were estimated at averages of between 5.0 and 31.6m³/hr.

Range Resources

Landsat information indicates a total of almost 630,000 hectares in the Southwest Region classed as range, representing almost 45 percent of the total area. Another 92,000 hectares, classed as barren, make up almost seven percent of the region's total land; during times of higher precipitation these lands may serve as an additional range resource.

For the most part, these range includes land too steep, rocky, shallow, infertile or arid for use in producing crops over extended periods of time. Instead the land is used, as in centuries past, for grazing, primarily by sheep and to a much lesser extent by cattle and goats. Grasses, grass-like plants, forbs and shrubs are grazed primarily during December through April after which the flocks are moved onto cropland residues. In addition to providing grazing for livestock, ranges of the Southwest serve as watersheds, providing water for streams, rivers and springs for irrigation, and livestock and domestic use.

The southern segment of the region has 330,700 hectares of range, about one-third of the total land in the segment. Major plants zones in this segment include the East and West Syrian, East Jordan River and, at the higher elevations, the Alpine and Lower and Higher Jebel Druze Zones.

There are 299,000 hectares classed as range in the northern segment of the region, some three-fourths of the total land in the segment. The Mountaineous Syrian, Alpine, East and West Syrian and Steppic plant zones are represented in this segment.

Observations indicate that ranges in the region have been heavily grazed for many years and the resource has deteriorated considerably below its potential for optimum livestock production.

Forestry Resources

Landsat information showed no land classed as forests in the Southwest Region, for brush lands and areas of newly planted trees that exist are classed as range. These lands occur at the higher elevations where average slopes are steeper than eight percent and where average annual precipitation exceeds 300mm. These conditions are common along the western side of the region.

Fisheries Resources

The Southwest Region has only limited water resources for fish production, either from natural waters or from warm water fish farms. A rainbow trout farm is located at Zabadani in the western part of the northern segment of the region. Planned production calls for an annual output of 30 tons of fish for consumption, 6,000 million eggs and 1.35 million six-month fingerlings. However, it appears that water temperatures are marginal or excessively high during summer months, precluding either survival or good growth response by rainbow trout.

Crop Suitability Ratings

Suitabilities for growing various crops, as discussed here, are based on climatic, physiographic and soil characteristics reviewed previously plus other factors, including inherent productive capacity, susceptibility to erosion and the need for special treatment before cropping is feasible.

Of the two segments in the Southwest Region identified previously, most of the land suitable for crop production under rainfed conditions occurs in the southern 70 percent of the region.

Parts of this segment, those in the southwest with higher precipitation, have medium potentials for growing small grains, pulses, oil crops, grapes, and rosaceous and non-rosaceous tree crops. In some locations here, however, special management practices would be required because of moderate susceptibility to erosion. Parts of the south central and southeastern segments of the region have medium suitabilities for production of small grains, olives, and rosaceous and non-rosaceous tree crops under rainfed conditions.

In the northwest, moderate crop potentials exist for small grains, olives and non-rosaceous tree crops.

The remainder of the region, for reasons of either lower precipitation, lower inherent productive capacity, steeper slopes, higher susceptibility to erosion or some combination of these factors, is

unsuitable for rainfed cropping. The most intensive land use suitability in most of these areas is for range or, in the northwest at the high elevations, woodland.

The southern segment of the region also has suitabilities for growing more crops under irrigation than the northeast segment although except for the southcentral part, where irrigation networks are located, this segment has very little water for irrigated crop production. The southernmost part of the segment has high suitabilities for small grain and oil crops and medium ratings for pulses, vegetables, grapes, olives and non-rosaceous tree crops. In the southwest area of the segment high suitabilities exist for all these crops plus oil crops and rosaceous tree crops, although growing these crops in some localities would require more intensive management.

The northern segment of the region, although having a greater supply of irrigation water, mainly through the Ghouta network, has a somewhat more limited irrigated cropping suitability than the southern segment. While having high ratings for small grains in several localities, the production potential for vegetable crops, oil crops, grapes, olives and non-rosaceous tree crops is only moderate. Rosaceous tree crops have a high suitability rating in the northwest segment, while small grains, vegetables, grapes, olives, rosaceous and non-rosaceous tree crops have high potentials in the Ghouta area. In general land suitable for irrigated crops far exceeds available water supplies.

Crop Production Potentials and Present Land Use

Given the climatic, physiographic and soil characteristics, together with rainfed and irrigated crop suitability determinations based on these characteristics, certain comparisons for planning purposes can be made between these potentials and actual uses. Comparisons should result in the identification of land not now being cropped that is suitable for crop production, land unsuitable for continuing cultivation that should be retired from cropping, and land suitable for crop production under irrigation.

While in the Southwest there are about 589,000 hectares of land in extensive agriculture and orchards, crop suitability ratings indicate that 600,000 hectares have the potential for this use (Table II-1). However 336,000 hectares of these lands have only a low potential under rainfed conditions. Achieving the recommended rainfed use of land in the region would entail keeping 425,000 hectares now in extensive use in that use (although 235,000 hectares have only a low potential) and bringing in 184,000 hectares of land now in other uses (of which 101,000 has only a low potential for rainfed cropping). At the same time, 18,000 hectares now in extensive agriculture could be shifted to intensive or irrigated use if water is available. Of the land suitable for rainfed crop production 284,000 hectares with low potentials lie in the southern segment of the region, also in the

southern portion are 121,000 hectares with a medium potential for rainfed crops but would require higher levels of management, including erosion control and less intensive cropping, to achieve optimum yields. Some 52,000 hectares with only a low potential for rainfed crops are located in the northern segment of the region.

Intensive use in the Southwest amounts to 66,000 hectares. Its potential for remaining in this use is considered generally high. With further irrigation development a total of 351,000 hectares have the potential for intensive agricultural use at medium to high levels. About 74,000 hectares with medium potentials are located in the southern segment of the region. The larger part of the high potential land for irrigation lies in the north. However, 62,000 hectares with this potential would require careful management in the use of irrigation and drainage to maintain proper moisture balance and to prevent salinity build up and to assure optimum yields. As mentioned previously, 18,000 hectares now in extensive use could be brought into intensive use. This land lies in the northern segment. Some 267,000 hectares of range land could be shifted to intensive use, about two-thirds of this area being in the southern segment of the region.

J. Steppe Region

General Description

The Steppe Type of Farming Region, encompassing almost 10.5 million hectares, makes up about 56 percent of the total land area of Syria. Rolling to undulating plains, steep limestone ridges, desert outwashes, plateaus and isolated mountains characterize this semi-arid to arid region. Summers are hot and dry, winters cool and wet, not unlike the Mediterranean type climate.

Current land use estimates, as derived from land cover/use information, indicate that more than 93 percent of the region's land area is range, over four percent in extensive agriculture, and less than one percent in intensive agriculture (Table II-1). Almost two percent of the total land area is classed as barren.

Climatic - Physiographic - Soil Characteristics

Twelve RPU's including 27 PPAs have been identified and described as the Steppe Region (Appendix Table II-1). The land of the region includes limestone ridges, outwashes, saline depressions, broad desert plains and plateaus. For the most part soils have been formed from limestone and, to a lesser extent, basalt on undulating plains; from unconsolidated materials on level to undulating plains; from weakly consolidated sedimentary rocks on level plains; and from limestone on maturely dissected plains.

Elevations vary widely over the region, ranging from 150-200m in areas of saline depressions north of the Euphrates and Tributaries Region near the border of Iraq; 320-450m near the Euphrates River; 500-1200m in the mountainous vicinity of Palmyra; and up to 1900m in other mountains to the northern and western segments of the region. Dominant slopes of from 0-8 percent are common throughout the region. Isolated mountains have dominant slopes of 25-45 percent.

Precipitation, falling generally from October through May, averages less than 250mm annually over most all of the region, except for small segments in the northwest joining the Undulating Plain where averages exceeding 300mm occur. Average monthly temperatures during the wet season range from 4-8°C in the higher elevations to 11-16°C elsewhere.

Soil depths are variable, averaging more than one meter on the gentler slopes and saline depresions to 50cm or less in the steeper areas. Soil textures are mostly medium to coarse with moderate to moderately rapid permeabilities. Available water capacities of the soils are moderate to low, generally, and well drained except for the small flat saline areas which are poorly drained.

Water Resources

All or parts of 13 of the 15 hydrologic units of Syria are in the Steppe Region (Fig. II-9). The Jesireh unit (A) encompassed almost one-fourth of the Steppe, the Wa Dil-Miyah unit (H) about 17 percent, the Al-Tanf (J) almost 11 percent, the Al-Rasafa (I) almost 10 percent, the Al-Daw (D) over 8 percent, and the Palmyra unit (E) over 5 percent. The remaining one-fourth of the region includes parts of all the other hydrologic units with the exception of the Horan and Coast units.

At the northwest edge of the Steppe lies a part of the Meskenah Unit of the Euphrates Project which is due to receive irrigation water from Lake Al-Assad. To the south of the Euphrates in the vicinity of Al-Rakka is the Risafe Unit of the Euphrates irrigation project.

Some 6 reservoirs varying from 500,000m³ to 2.2 million m³ in size and with a total capacity of 6.6 million m³ are located in the southwest segment of the Steppe. All but one-third of the stored water is scheduled for domestic and livestock use. Two of the reservoirs stored no water in 1978. Also a 270,000m³ reservoir is under construction for domestic use. In the west-central part of the region there are a total of seven reservoirs ranging in size from 750,000m³ to 5.0 million m³, with a total storage capacity of 8.7 million m³ for domestic and livestock uses primarily. Also in this part of the region, a 13.0 million m³ total storage capacity for two reservoirs is planned, while a 400,000m³ reservoir is under construction. Over the remainder of the Steppe three other reservoirs, totalling a 4.85 million m³ storage capacity are used for domestic and livestock purposes. Two other reservoirs with a combined capacity of 21-6 million m³ are planned for 1981.



Figure II-9. Resource Planning Units, Hydrologic Units and Irrigation Facilities - Steppe Region.

Water Basin Administration and other government test wells have been drilled in most areas of the Steppe. In the southwest, wells developed mainly for the domestic and livestock water, have depths that vary from 70 to 274m, with water yields of 3.2 to 14.8m³/hr. In the west-central segments, wells for the same purposes vary from 168 to 492m in depth, and yield 5.2 to 41.8m³/hr. In the north, well depths ranged from 141 to 501m and yields from 15.2 to 16.3m³.

Heavy emphasis is being placed on domestic and livestock water development in the Steppe, including the drilling of new wells, and cleaning out of cisterns and canals dating back to Roman times.

Range Resources

The more than 9.8 million hectares of range in the Steppe Region accounts for almost 80 percent of Syria's total range. An additional 161,000 hectares of barren land provides limited grazing in some years. Vegetation of the Steppic plant zone populate most of the region except the higher elevations where plants typical of the Mountains of the Steppic Zone occur. Grazing periods in the Steppe last from December-February though May-June.

Sheep raising is the primary livestock enterprise, although lambs may be grazed in the Steppe during a growing-out period before slaughter or being fattened in feedlots near the larger cities outside the region. Milk and milk products and wool are also important products. Most flocks are owned or tended by Bedouins, including those who live in villages bordering the Steppe and those who live in the Steppe. There are a declining number of camel herds, also owned by Bedouins that are kept for milk and meat production.

There are three main types of sheep grazing systems used in the Steppe:

- (i) constant grazing in the Steppe by nomads living in the Steppe;
- (ii) seasonal grazing with movements easterly (to the Steppe) and westerly (to crop residues) practiced by nomads who live in villages and towns near the Steppe;
- (iii) irregular and short term eastern movements into the Steppe practiced by semi-nomads and other people who own large flocks living in villages outside the Steppe.

These systems are largely uncontrolled although range and sheep cooperatives are being formed to demarcate grazing areas and control grazing. While supplemental feed programs have served to reduce extreme fluctuations in sheep number as forage supplies fluctuate, and water is being developed to furnish livestock requirements and better distribute grazing, indications are that the range continues to be overgrazed.

Other practices leading to range deterioration include plowing and planting of barley; gathering of shrubs in the Steppe for fuel, and indiscriminant use of vehicles and the accompanying formation of unplanned road systems.

Continuation of these practices, some of which have gone on for a long time, leave little opportunity for realizing the real potential of the vast range resource in the Steppe. Few short cuts to improvement are available, such as seeding, which is known to be hazardous in areas receiving less than 250mm of rainfall annually and which requires range development and grazing control even where this practice is possible. Similarly, planting of shrubs, which is known to require high investments relative to returns and which is highly dependent upon proper grazing management, would be hazardous.

Without a rapid step-up of range management, the more palatable forage species will continue to disappear, grazing capacities decline, erosion accelerate and values of range for livestock production and watershed protection will be greatly reduced.

Forestry Resources

There are no forestry resources in the Steppe Region showing up in the Landsat imagery analysis. Low growing deciduous trees occur in some areas of the mountains although these trees have no commercial value.

Possibilities may exist along the northern edge of the Steppe in the Meskenah and Risafe units of the Euphrates irrigation project for raising poplar trees for pulpwood and paper production in a similar manner as discussed in the Euphrates and Tributaries section.

Fishing Resources

The absence of large dams, rivers or streams in this region leaves little opportunity for development of fisheries resources.

Crop Suitability Ratings

Inherent productive capacities of soils in the Steppe Region generally from very low to medium, and susceptibilities to erosion from low to high (Appendix Table II-3). The limiting factor for rainfed agriculture is rainfall, and the only segments with any rainfed crop potential are in the far west-central, with moderate potentials for small grains and in the north near the Euphrates and Upper Khabour with low potentials for small grains and pulses.

Although irrigation water supplies are essentially lacking over most of the Steppe, indications for medium to high potentials for most crops under irrigation appear in most areas, except those where slopes are too steep and soils too shallow or saline. Crops with the best potentials include small grains and pulses.

Crop Production Potentials and Present Land Use

Analysis of Landsat imagery for the Steppe indicates that 441,000 hectares or four percent of the total land is used for extensive agriculture and 84,000 hectares or less than one percent of the total land area is used for intensive agriculture (Table II-1).

Only 226,000 hectares of land are considered as having potentials for remaining in rainfed crop production although the potential is low. This includes the land in small segments of the northwest section of the Steppe. Some 213,000 hectares now in extensive use but receiving less than 250mm of rainfall would be better suited for other uses, such as range. This land include segments in the west-central and north-western parts of the region.

If irrigation water becomes available there are 191,000 hectares of land now in extensive use that could be suitably irrigated, and 4,715,000 hectares now in range that could also be irrigated. The 84,000 hectares now irrigated have the potential for remaining in irrigated use.

The net result of these possibly shifts would be to retain in extensive agricultural the 226,000 hectares with low potential under rainfed conditions, and, if water is available 2,077,000 hectares with high potential and 2,913,000 hectares with medium potential under irrigation, leaving 5,254,000 to other uses.

K. Conclusions

Adjustments in Land Use

Land in Syria was classified, as of 1978, into the following broad categories through the interpretation of remote sensing imagery: Intensive Agriculture (major areas receiving full or supplementary irrigation and with multiple cropping potentials) 683,000 ha; Extensive Agriculture (areas in rainfed crops, fallow or orchards and with no potential for multiple cropping unless irrigated) 5.2 million ha; and Other (areas devoted to range, forest or non-agricultural uses) 12.8 million ha.

Subsequently, these current uses were compared with land use potentials. From these analyses possible land use adjustments were identified for increasing agricultural production, while at the same time maintaining the productivity of the land resources.

Increases in agricultural production may be achieved through investments to improve the productivity in each of these categories, as well as through shifts of land in some categories to more intensive uses. Maintenance of long-term productivity will require shifts of some land now used for extensive agriculture or non-crop uses.

Intensive Agricultural Areas

About 3.6 percent of the total land area is classified as being intensively cultivated, and of this area most all is judged to have medium to high potential for continued intensive use and multiple cropping. Almost 30 percent of the total intensive agricultural area lies in the Euphrates and Tributaries Region, 20 percent in the Lowlands, and 12 percent each in the Undulating Plains and Steppe regions.

The medium to high potential of this land for continued intensive use, as well as the existing large investments and established water rights, clearly indicate that changes in general uses are neither desirable nor feasible. In addition, it does not appear that lack of suitable land will be a constraint to expanding the area of irrigated crop production. There is sufficient soils with suitable characteristics to increase the area of irrigated land to the full extent that the supply of irrigation water will permit. Even the full development of the Euphrates Region itself, and other projects in the general area, will not begin to exhaust the land within the general area that is suitable for development of irrigated crop production. There are extensive areas in other type-of-farming regions which could also be developed if irrigation water were available.

Steps to increase productivity of currently irrigated land are likely to provide the most rapid increase in total production and should be given high priority in the Fifth Five-Year Plan. However, in order to meet long-run needs, it is essential that the irrigated area be expanded to the greatest extent possible.

The following recommendations relate to the planning of future development of irrigated production.

1. Give first priority to inclusion of funds in the Fifth Five-Year Plan for completion of projects already proposed for renovating and improving existing irrigation facilities and networks. Most of the proposed projects were included in the Fourth Five-Year Plan, but because of lack of funds or for other reasons were not fully implemented. Completion of these projects would increase the supply of water and reduce seasonal and annual variability in existing irrigated areas. This would reduce the major constraint to multiple cropping and would be a major step toward attainment of the 1.60 to 2.00 intensity ratio goal. The private sector could be encouraged to participate in attaining this goal by providing at least partial funding through government loans for installing additional pumps in existing irrigated areas for supplemental irrigation.

2. Initiate new detailed studies or re-evaluations of the technical and economic feasibility of increasing productivity through improved drainage in most of the irrigated areas but particularly in RPU 10 (Southwest Region); of breaking the impervious layer underlying the irrigated areas in RPUs 48 and 49 (Undulating Plains Region); and of providing soil amendments to improve the structure and modify the alkaline and saline conditions on the terraces above the Euphrates floor in RPU 32.

3. Provide technical assistance to farmers for increasing the on-farm efficiency of water use by improving water distribution systems in individual fields, including improved ditch layouts, lining of ditches, control of weeds, land levelling, and installation of sprinkler systems where feasible.

4. Establish a pricing system for irrigation water use that would provide incentives to individual farmers to utilize water more efficiently. Providing irrigation water free of charge or at low standardized charges to all farmers in a project area encourages wasteful use of water. It does not appear feasible in the near future to relate charges for water from public networks to measured amounts of water used. However, it would be feasible to establish charges more nearly reflecting cost of providing water and to adjust per hectare charges for farmers adopting water conserving practices.

5. Proceed as rapidly as technical and economic feasibility studies are completed with development of all viable new irrigation projects. The decision to at least postpone development in RPU 42 (Euphrates Region) and to further evaluate alternative areas appears to be fully justified.

Extensive Agricultural Areas

Land classified as being used for extensive agriculture, which includes rainfed crops, fallow and orchards, accounts for about 27 percent of the total land area and for about two-thirds of all crop production.

About 2.0 million of the 5.2 million ha of these lands are in areas receiving 300mm or more of rainfall and are judged to have medium to high potential for continued rainfed crop production. With moderately good management practices, the productivity of this land can not only be maintained but also increased. No change in use of this land is indicated, except in instances where portions of it could be irrigated and more intensive use attained.

An additional 1.7 million ha of extensively cultivated land lying in areas which average only 250-300mm of highly variable rainfall annually have only low potential for rainfed crop production. This land can be maintained in extensive agricultural uses, but because of the limited rainfall there is only limited possibility of increasing yields and returns.

There are about 1.5 million ha currently used for extensive agriculture that are judged to be unsuitable for such use. Conversion to range, pasture or woodland appears to be the most suitable use.

An estimated 296,000 ha of non-cultivated land scattered through all regions could be converted to rainfed crop production, but potentials are rated as medium or low.

Recommendations for the future use of land now extensively cultivated are as follows:

1. Retain the 2.0 million ha with high to medium potential for rainfed crop production in that use, but continue and strengthen efforts to increase intensity of use and to improve structure and productivity of the soil. Further substitution of forage legumes for fallow would help meet the urgent need for forage, and the crop residue would increase available water and plant food capacity of the soils. The limited information available indicates that substituting legumes for fallow will not reduce significantly subsequent yields of grains or other crops in the rotation, even in the short-run, and in the long-run will increase yields. Farmers will need assistance in acquiring, and technical guidance in using, machinery for effective forage production.

2. Retain, at least in the short-run, the 1.7 million ha with low potential for rainfed cultivation in that use, except in those areas that might be converted to irrigated production. Over time some producers may find the low and irregular yields and income to be derived from these areas to be unacceptable. With the greater than average increase in demand for livestock products, the prices of these products may be expected to increase relative to prices for crops now produced on this marginal land. At that time government programs to assist in converting such land to range uses would be desirable. Such programs might involve loans to assist operators in establishing cool season perennial grasses and semi-desert shrub cover such as Atriplex, and in acquiring livestock to utilize the restored range. The program should also provide for extension of technical information necessary for successful conversion. Prior to initiation of such a program, research and field testing should be undertaken to determine the most suitable species of grasses and shrubs for each area.

3. Convert as rapidly as possible the 1.5 million ha not suitable for continued rainfed crop production to less extensive use. This would include the following: convert to woodlands the 69,000 ha of highly erosive land with slopes of 15 percent or more and over 300mm of annual rainfall, in the Southwest and Mountain Regions and in adjoining transitional areas. Reforestation of some of this area has already been initiated but generally has not reached a stage of development that could be distinguished

on the remote sensing imagery; convert to pasture the 481,000 ha in the Undulating Plains with gentle slopes receiving 250mm or more of annual rainfall, but generally comprising shallow soils with imperious sub-soil layers; and convert to range use the 707,000 ha in the transitional zones between the Steppe and adjoining areas in the Northeast and Southwest which receives less than 250mm of annual rainfall.

Other (Non-Crop) Land

The remaining 12.8 million ha not used for crop production includes 130,000 ha identified from the remote sensing imagery as being covered by water or urban development and 150,000 ha of woodland or forests. About 12.5 million ha is used for grazing. Most of this land lies in the very low rainfall areas of the Steppe and adjacent regions. However, it includes about 580,000 ha in the higher rainfall regions in the western part of the country. Of this amount, an estimated 180,000 ha has high or medium potential for rainfed crop production. Most of the remaining 400,000 ha in the high rainfall area now being grazed has scattered woodland growth and is probably included as forest land in the statistical reports. Most of this latter area is subject to severe erosion and its best use would be for forest production. About 280,000 ha lying in the Euphrates Region has high or medium potential for irrigated crop production and is expected to be converted to that use. Limited additional areas in other regions might also be converted to irrigated crops.

The following suggestions are offered for consideration in planning the future use of the 12.5 million ha now being used for grazing.

1. Convert land with high or medium potential for irrigated crop production lying in areas where irrigation water is available to irrigated use as rapidly as possible. This would include the 280,000 ha in the Euphrates Region now used for grazing plus additional areas in other regions that could be irrigated from the Euphrates or from any other long-term sources of water.

2. Initiate feasibility studies of converting the 180,000 ha now used for ranged or woodland but with high to medium potential for rainfed crops located primarily in RPU 2 and 5 in the Southwest, RPU 29 and 34 in the Lowlands and RPU 38 in the Undulating Plains. If viable, initiate projects to accomplish this conversion.

3. Initiate programs to eliminate grazing and establish woodlands on the 400,000 ha of highly erosive soils in the high rainfall areas of the West. In the long-run, forest based industries should provide expanded employment and incomes for people in these area but in the short-run, people now depending on grazing of livestock will be displaced and will need assistance in finding other employment and sources of income.

4. Retain the remaining 11.75 million ha in range or grazing lands. The plant cover on this land has deteriorated and its productive capacity seriously impaired. Improvement in the quality of this resource will require control of grazing and establishment of other improved range management practices that are discussed in subsequent sections of this chapter.

Water Resource Development

The expanding demand for food and other agricultural product in the coming decades will require that even greater emphasis be given to development and full utilization of the nation's water resources. Priorities on the direction of water resources development will need re-evaluation since hydrologists advise that the completion of the water development programs now planned will essentially harness all of the surface water and spring flows above the reservoirs, except possibly the Euphrates River. Depending on the present redevelopment project under study, some spring flow waters would still go to the sea from the Orontes River.

Thus except for the Euphrates project and one or two smaller projects, improved water use efficiency may be the major opportunity to enlarge the effective water supply in Syria. As indicated in the preceeding section on Adjustments in Land Use, measures and investments involved here would relate to renovation of canals, rehabilitation and reorganization of irrigation networks, reduction of evaporation, improved water management, and introduction of technologies such as sprinkler irrigation.

Groundwater resources are not well identified or described, especially with regard to annual replenishment and use. With improved information, a much needed integration of surface and ground water supplies and uses could be achieved.

Public irrigation development programs have been largely oriented toward construction of large-scale irrigation networks. However, these networks do not include a large portion of the total land area classified as irrigated. A careful review and analysis may be useful as to whether public funds are being too heavily allocated to large projects with associated inadequate attention being given to other needs and opportunities.

An essential step required for successful development of irrigated agriculture in the Euphrates project seems to be the rapid and complete pre-development of farm land, farm irrigation systems and drainage. The pre-development program should also be accompanied by a rigorous education program for settlers and managers.

A major need exists for an enlarged program in research and education relative to irrigated agriculture. Economic, agronomic, and engineering research are needed along with and associated programs to extend research results to farmers and irrigation managers and administrators. Improved statistics are needed, and data on all irrigation water supplies and use need to be incorporated into the Resource Planning Unit (RPU) system.

Range and Sheep Development

The Steppe region encompasses over half of the land areas of Syria. Although unsuitable for rainfed crop production, utilization of the range land in the region for sheep production makes it one of the major agricultural resources of the Nation. Steps have been taken by the government to protect the range and improve the level of living of people in the region. However, there is clear evidence that deterioration of the range is continuing and may even be accelerating. The level of living of people in the region appears to have improved but still continues below that of people in other rural areas. The following measures are proposed as means of alleviating these conditions.

An organization for Steppe Development should be established as soon as possible to coordinate the planning and implementing of the many programs designed to provide technical and social services to the Steppe. The organization should be similar to the General Administration for the Development of the Euphrates Basin in its organizational structure and function. The scope of its activities should include not only the technical activities relating to range improvement and sheep production but also input and commodity marketing and the provision of social services.

A program to provide sound range management for the entire region should be initiated in the Ministry of Agriculture and Agrarian Reform at the earliest possible date. It is suggested that the Steppe be divided into several Grazing Management Areas each having similar soils, vegetation and climatic conditions. The 10 RPUs, designated as the Steppe region might be used as the basis for delineating the Grazing Management Areas. A staff of range and animal husbandry technicians should be recruited and trained to serve each Area. The staff would be responsible for developing grazing plans specifying the number of sheep and time allocations for grazing under average, above average and below average rainfall conditions. The staff would issue permits for grazing according to the grazing plans developed and be authorized to revoke permits of violators. The staff would also provide technical guidance to sheep producers.

The programs of the Range and Sheep Stations located in the Steppe should receive added financial support and direction to strengthen staff and expand research activities. Added research emphasis should be given particularly to the study of flock management, optimum stocking rates, plant response to variable grazing practices, and to plant palatability and feed values.

The establishment of a Mohafaza encompassing only the Steppe region would facilitate the functioning of the Steppe Development Organization and the Range Management Program. Currently any organizational unit concerned with any part of the development of the region must deal with many Mohafazat governments all of whom are more concerned with crop production and with people in the more humid areas than with range and sheep production and the people living in the Steppe. A Mohafaza concerned only with the region would allow the local government officials to become more familiar with the needs and customs of the population, concentrate on its special resource problems, and elicit more contacts, understanding and active support of the people in the area.

Forest Development

According to remote sensing imagery, over 81 percent of the 149,800 hectares of total land in forests is located in the Mountain Region and over 18 percent in the Lowlands. These current land uses, combined with other land in the Mountain and Southwest regions now classified as range but considered more suited for forest or woodland present a considerable potential for forest development.

Management of Natural Forests

Recommendations for development of the natural forests include:

For the Kassab Area highest priority must be given to establishing permanent legal boundaries of the forests to prevent agricultural encroachment. A timber stand improvement program should be started which will remove other trees and allow the younger trees to develop properly. Protection from fire, grazing and encroachment are essential, and law enforcement should be intensified. Prescribed burning as a fire control technique should be considered. Along roads and streams, strips of trees should be left for visual enjoyment and stream protection.

In the Foruluq Area sites near the spring should not be harvested, for these are relic plant areas of major scientific significance. Currently, the areas are subjected to uncontrolled use and in danger of being destroyed.

The Slunfye Area, essential for watershed management purposes, should be converted from oak to coniferous species on the lower slopes and protected from public use.

Several conversion areas, such as the one northwest of Aleppo, have stands of low shrubby oaks of low value. Conversion of these stands to adapted pines is appropriate and should be carried through to completion.

Forestry Research

Considerable forestry research has been done in Syria, and the results should be compiled as background materials for a thorough problem analysis for forest development and to eliminate duplication of the research efforts.

Two possibilities appear feasible for forestry research.^{1/} One would be for the Directorate of Agricultural Research to add forestry to the research program. Decisions on research priorities would be made through consultation between the Director of Forests and a committee of experts from ACSAD, and from Aleppo University and Latakia University, which have some courses in forestry. A second possibility would be a contract arrangement with Aleppo University which has research institutes, although none in forestry.

Forestry research should include a forest tree genetics program for improvement of native species, including the pines of northwestern Syria and Populus euphraticus along the Euphrates River. A forest tree genetics research program should be concerned with testing the adaptability under local conditions of non-native (exotic) species. At least five species of Pinus, and one each of Juniperus, Juglans, Prunus, Fraxinus and Psuedotsuga are suggested for trial. The scientific breeding program for native and exotic trees should provide seed for future forests.

Other research opportunities include watershed management, sand dune stabilization, mycorrhizal relations, forest ecology, naval stores production, and marketing of logs and wood products.

Afforestation

Afforestation of severely eroded soils where rainfall is sufficient for growing trees is a pressing need. Also interplanting of nitrogen fixing trees or herbaceous vegetation with crop trees. Two trees well adapted for this purpose are Robinia pseudoaccacia and Cerratonia siliqua.

Forestry Extension and Education

Until recently, there has been no forestry extension program in Syria. It is strongly recommended that forestry be included in the new extension program to disseminate information concerning the necessity for keeping grazing, fires, and similar threats away from the new forests and the existing natural forests.

^{1/} It has been reported that a Section on Forestry Research has since been established at the Directorate of Agricultural Research at Duma.

There is a need for advanced training and education among the foresters of Syria. Graduate students could be trained under a co-operative arrangement with a forestry research institute once established or through participation in graduate programs of recognized schools of forestry outside Syria.

Fisheries Development

Programs for the development of Syria's fisheries have aimed at increasing the fish catch from both marine resources of the Mediterranean Sea, and from inland water resources, including rivers and man-made lakes behind dams, as well as fish production farms.

Evaluations of the various fishery development programs have been grouped as follows: natural water fisheries, such as Lake Al-Assad on the Euphrates River; warm water farms such as those in the Ghab; trout farms such as those at Zabadaneh and Lattakia; and marine fisheries along the Mediterranean Sea coast. Recommendations for fisheries development in each category follow.

Natural Water Fisheries

Recommendations for natural water fisheries include: Increase the harvest of fish by providing incentives to cooperatives, or use of government operated gear. Experiment with large hand seines and trap nets. Experiment on a larger scale with net cage culture of fish, as is now being done on a small scale at Lake Al-Assad. Establish a species of fish to serve both as a food fish and as a predator on small cyprinids in Lake Al-Assad. Control fishing pressures and methods through work with cooperatives.

Warm Water Farms

Recommendations for warm water farms are as follows: Reconstruct supply canals where grades are improper, construct outlet structures with adequate screen area, and remove obstructive vegetation such as reeds by mechanical means. Prepare nursery ponds sufficiently in advance of stocking to permit a build up of natural organisms. Continue to experiment with methods to receive earlier spawning and a longer growing season. Feed fresh pelleted food and experiment with green forage in lieu of using pelleted feed held in storage for months. Impress on fish farm and hatchery personnel the need of capturing, handling and transporting fish in the most gentle fashion possible. Keep accurate fish farm records. After these items are completed construct an additional two or more fish farms, avoiding the pitfalls which limit production at existing farms.

Trout Farms

Recommendations for trout farms include: Build future trout production farms that depend on gravity flow of water rather than use of expensive pumping. Construct future facilities for trout farms keeping

in mind water quality analyses, long-term air and water temperature limits, and water rates of change for feed fish growth potential.

Marine Fisheries

Marine fisheries recommendations are as follows: Syria should join with other countries in a cooperative effort to increase fish yields from the Mediterranean Sea. Use of baited traps and baited long lines would be justified for a period of testing. A research program should be established to identify stocks and abundance of fish, to search out new fishing grounds, and to determine which tackle and methods are most effective.

Other Recommendations:

Establish a small group of fish research and management personnel for solving marine and inland fish production problems. Develop a method of collecting fishery data regarding fish production from the various types of organizations including government, cooperative and private means of harvesting.

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CHAPTER III

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CHAPTER III

AGRICULTURAL PRODUCTION

Assessment of the potentials for increasing future output of crop and live-stock products in Syria must take into account recent and current uses being made of the nation's agricultural resources. Trends in land use and in commodity output reflect various physical, economic and policy influences that affect the agricultural production process. While these influences are usually interrelated and operate simultaneously, their combined net effects are reflected in production trends, as well as in patterns of farm production costs and returns. Analyses of these trends and economic relationships can thus provide useful guidelines for planning agricultural development.

This chapter summarizes results of national land use, crop and livestock trend analyses, and presents major findings on production costs and returns obtained from a farm survey made of 1,500 holders located in all regions of Syria. Detailed data from these studies by Mohafazat, Mantika and Type of Farming Region, as well as information on methodologies, are given in Volume 3.

A. National Agricultural TrendsTrends in Land Use

The total cultivated area, including both cropped and fallowed land, averaged 5.8 million hectares in 1968-77, ranging from 5.5 million in 1968 to 6 million in 1974 (Table III-1). There was no significant trend during the period due primarily to the year to year variability, but the cultivated area dropped during the last 3 years to a level about 6 percent below the average during the preceding 7 years. This downward shift in the use of the cultivated area was accompanied by a very substantial shift in the use of the cultivated area from fallow to rainfed crops. The average area of fallowed land in the last 3 years of the period was 41 percent below that of the preceding 7 years and fell from 46 percent of the total cultivated area to 28 percent. At the same time rainfed crop area increased by 29 percent and rose from 45 percent to 62 percent of the total cultivated area.

The area of irrigated land increased for the first five years of the period but declined thereafter so that there was no appreciable change over the period in either the absolute amount of irrigated land or in the proportionate share of the total.

The shifts in the total cultivated area and in major use categories have been accompanied by changes in the intensity in the use of land and the distribution of land among different groups of crops. The area actually planted in non-irrigated crops of all types - annuals plus perennials - increased an average of 124,000 ha per year in the 1968-77 period (Table III-2). This increase in the area planted in rainfed crops was achieved through the diversion of fallow to cropped land and not through any significant increase in multiple cropping.

However, the net effects of these shifts was a rather steady upward trend in the intensity of use of rainfed crop area with a particularly marked increase for the 1975-77 period. During this latter period the intensity ratio (the ratio of land planted in rainfed crops to the land available for such use) averaged 0.64 compared with an average of only 0.50 for the entire decade.

Table III-1. Estimated Average Land Use and Intensity Ratios, Syrian Arab Republic, 1968-1978

Land Use and Intensity Ratios	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1968-77 ave.
Estimated Land (000 ha)											
Rainfed	2169	2935	2841	2340	2479	2778	2956	3184	3702	3336	2872
Irrigated	475	546	450	476	625	619	578	516	547	531	536
Fallow	2814	2395	2608	3092	2897	2481	2493	1776	1295	1642	2349
Total	5458	5876	5899	5908	6001	5878	6027	5476	5544	5509	5757
Intensity Ratios											
Rainfed 1/											
- Summer	.048	.040	.022	.027	.039	.073	.040	.043	.045	.048	.035
- Winter	.343	.390	.493	.375	.400	.498	.445	.583	.612	.574	.464
Total	.391	.430	.515	.407	.439	.521	.485	.626	.657	.622	.499
Irrigated 2/											
- Summer	.674	.591	.727	.664	.584	.490	.535	.619	.614	.656	.592
- Winter	.225	.208	.258	.280	.217	.267	.358	.428	.452	.444	.387
Total	.899	.799	.985	.944	.721	.757	.893	1.047	1.066	1.100	.899

1/ Hectares Rainfed Summer and/or Winter Crops divided Hectares Rainfed Cultivated land minus Hectares Rainfed Perennial Crops plus Hectares Fallow Cropland.

2/ Hectares Irrigated Summer and/or Winter Crops divided Hectares Irrigated Land minus Hectares Irrigated Perennial Crops.

Table III-2. Annual Average Change in Area Planted in Crops by Rainfed and Irrigated Crop Groups, Syrian Arab Republic, 1968-77.

Crop Group	Average Annual Change		
	Rainfed Crops (hectares)	Irrigated Crops (hectares)	All Crops (hectares)
Annuals:			
Winter	105,163	15,163	121,116
Summer	4,147	905	5,052
Total	109,310	16,858	126,168
Perennials	15,148	1,177	16,325
All Crops	124,458	18,035	142,493

Since the irrigated area remained about unchanged, the 18,000 ha annual increase in the area planted to irrigated crops was achieved through an increase in multiple cropping. The intensity ratio for the irrigated lands also moved up sharply during the last three years of the decade.

The improvement in intensity of land use in recent years for the Nation reflected improvements in intensity ratios in all regions with the Northeast experiencing a larger than average improvement. However, there are major differences among regions in intensity ratios. These differences, largely due to differences in rainfall, are likely to persist. However, these differences suggest types of programs that might be most successful in continuing efforts to further improve intensity of use.

For the rainfed area, continued improvement must be achieved through further conversion of fallow to crop production. Limited rainfall during summer months sharply limits or eliminates the possibility of multiple cropping through increasing the production of summer crops. However, elimination of fallow and continuous cropping of the northern portion of the Northeast region and the western portions of the Southwest and Undulating Plains Regions appears feasible, particularly if the rotation contains a leguminous forage in combination with wheat or barley.

For irrigated areas, more intensive use by increasing summer crops probably will be dependent upon improvement of existing irrigation systems and increasing well irrigation to assure more dependable supplies of water. However, the very low intensity ratio for winter crops in many regions suggest the possibility of expanding the planting of such crops. A short season legume planted in irrigated cotton fields just prior to or just after harvest would increase the supply of badly needed forage and at the same time provide some nitrogen for the following summer crops. Short season winter forages could also be grown in combination with other summer crops or short season winter vegetables might be substantially increased particularly in areas near metropolitan centers.

Trends in Major Crops

As indicated above, the major portion of the increase in cropland planted during the 1968-77 period was accounted for by the increase in rainfed winter crops. Rainfed wheat and barley accounted for 92 percent of the increase in this group of crops and 68 of the total of all crops. Irrigated wheat and summer fruits and vegetables and rainfed grapes and olives, also increased substantially. Both rainfed and irrigated cotton has declined significantly. Most of the more important irrigated crops showed significant yield increase but very few of the non-irrigated crops had such increases.

Winter Crops

No significant production or yield trends were found among the non-irrigated winter crops (Table III-3). Significant upward trends in area planted were demonstrated for total wheat, rambling vetch, bitter vetch, flowering sern and broad beans. The occurrence of significant area planted trends without significant production or yield trends under uncertain weather conditions suggests that achievement of stability in dryland crop production has been pursued through the expansion of areas planted, rather than through yield improvement resulting from introduction of new technology.

The majority of irrigated winter crops demonstrated significant upward trends in area planted and in production, the exceptions being lentils and rambling vetch (Table III-4). Significant yield improvement has occurred in total wheat, lentils, broad beans, cabbage and cauliflower. Total wheat, broad beans, cabbage and cauliflower demonstrated significant upward trends in area, production and yield.

Summer Crops

Several of the non-irrigated summer crops demonstrated significant upward trends in area planted over the 1968-1977 period (Table III-5). Included in this group are tobacco, tomatoes, potatoes, maize, dry onions, okra, pumpkins, squash and sesame. All of these crops except maize and okra demonstrated significant average annual changes in production for the same period. Cotton and millet demonstrated decreases in area planted.

Table III-3. Estimated National Trends in Area, Production and Yield of Nonirrigated Winter Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (kilograms/hectare)	10 Year Average (kilograms/hectare)
Total Wheat	52,145* *	1,260,751	61,855	930,371	19	732
Barley	44,726	825,141	22,736	488,497	- 16	637
Lentils	3,533	115,662	4,660	77,714	19	671
Chickpeas	2,134	52,589	343	34,878	- 21	673
Dry Broad Beans	- 285*	3,841	- 118	3,564	40	962
Rambling Vetch	1,086*	34,179	1,223	23,979	16	700
Bitter Vetch	638 **	22,849	- 348	14,283	- 33	626
Flowering Sern	1,046*	6,976	650	5,712	- 15	817
Broad Beans	131 *	2,202	689	10,098	91	4,516
Cabbage	- 1	8	- 1	104	1,354	8,067
Cauliflower	1	2	12	47	1,564	6,200

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Table III-4. Estimated National Trends in Area, Production and Yield of Irrigated Winter Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (kilograms/hectare)	10 Year Average (kilograms/hectare)
Total Wheat	14,828 **	127,541	40,348 **	235,634	123 *	1,718
Barley	- 21	13,995	1,402 *	19,305	88	1,410
Lentils	129	3,600	397	3,964	55 *	1,047
Chickpeas	45 *	254	49 *	298	-23	1,176
Dry Broad Beans	131	3,558	- 511 *	6,309	66	1,760
Rambling Vetch	- 23	342	- 10	435	31	1,292
Bitter Vetch	25 *	95	27 *	107	-13	1,137
Flowering Sern	84 *	891	127 *	1,103	23	1,208
Broad Beans	234 **	2,942	3,261 **	21,718	500 **	7,047
Cabbage	227 **	1,864	5,660 **	33,574	866 **	17,111
Cauliflower	294 **	1,777	5,972 **	29,356	681 **	15,588

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Table III-5. Estimated National Trends in Area, Production and Yield of Nonirrigated Summer Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (kilograms/hectare)	10 Year Average (kilograms/hectare)
Cotton	-4,918 *	26,508	-1,618	8,836	16	319
Tobacco	772 **	13,749	429 *	9,255	- 9	678
Sugar Beets	148	674	3,290	15,503	2,448	9,136
Tomatoes	945 **	7,622	3,598 *	35,168	- 70	4,693
Potatoes	130 *	1,090	1,467 *	10,551	487	8,827
Watermelon	2,988	58,536	31,120	378,114	184	6,113
Maize	229 *	2,477	203	2,058	10	811
Millet	-1,407 *	24,487	-1,419	17,259	- 11	688
Muskmelon	82	17,951	7,626	117,117	413	6,289
Dry Onions	124 *	1,681	1,032 **	9,695	252 *	5,571
Okra	435 **	2,243	365	4,039	- 171 **	2,053
Eggplant	2	5	14	44	939 *	3,022
Pumpkins	452 **	2,028	4,085 **	14,512	615 *	5,745
Haricot Beans	- 16	286	- 65	1,134	- 11	3,993
Dry Haricot Beans	4	60	5 **	42	45 **	679
Cucumbers	332	5,436	1,767	24,848	41	4,390
Squash	82 **	1,274	648 *	9,549	11	7,440
Sesame	2,735 **	16,748	679 *	4,561	- 13	280
Sunflower	188	1,329	111	1,140	- 37	825
Peanuts	-	-	-	-	-	-

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

During this period, significant yield improvement was found for dry onions, eggplant, pumpkins and haricot beans. Okra demonstrated a significant downward yield trend.

Only dry onions and pumpkin have significant upward trends in area, production and yield.

With the exception of cotton, tobacco, sugar beets, millet, pumpkins and sunflower, all irrigated summer crops demonstrated significant upward trends in both area planted and production for the 1968-1977 period (Table III-6). Sunflowers had a significant upward trend in area planted. Cotton recorded a significant downward trend in area planted counter-balanced by a significant upward trend in yield to maintain a relatively constant (no trend) production level.

In addition to cotton significant upward trends in yield were recorded for tobacco, tomatoes, maize, muskmelon, dry onions, okra, eggplant, haricot beans, dry haricot beans, cucumbers and squash.

Significant upward trends in area planted, production and yield were found for tomatoes, maize, muskmelon, dry onions, okra, eggplant, haricot beans, dry haricot, cucumbers and squash.

Perennial (Fruit) Crops

Nonirrigated grapes, olives, apples, plums, green plums and peaches demonstrated upward trends in planted area (Table III-7). All upward trends in area planted were accompanied by significant increase in total production. Only green plums and peaches had significant yield increases.

Significant upward trends in area, production and yield were found for irrigated apricots, apples, plums and peaches (Table III-8). Upward trends in area planted were found for olives, green plums and pomegranates, with a downward area planted trend for figs. Increasing yield trends were recorded for grapes and figs. Green plum production was also shown to have an upward trend.

Table III-6. Estimated National Trends in Area, Production and Yield of Irrigated Summer Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (kilograms/hectare)	10 Year Average (kilograms/hectare)
Cotton	-7,905 **	204,260	1,353	394,252	82 **	1,954
Tobacco	44	473	88	696	178 **	1,180
Sugar Beets	88	7,820	1,243	188,813	- 65	24,231
Tomatoes	996 **	15,824	32,835 **	279,057	981 **	17,102
Potatoes	716 *	6,642	10,680 **	88,561	237	13,155
Watermelon	473 **	2,586	6,223 **	34,703	81	14,484
Maize	2,118 **	10,009	5,142 **	19,804	72 *	1,787
Millet	160	2,077	311	2,525	46	1,161
Muskmelon	138 *	1,253	2,547 **	15,641	627 **	12,053
Dry Onions	247 **	5,424	10,212 **	86,407	1,172 **	15,453
Okra	104 **	1,687	1,150 **	8,863	376 **	5,063
Eggplant	263 **	5,321	7,907 **	76,674	766 **	14,081
Pumpkins	45 **	742	1,046 **	9,165	674	11,428
Haricot Beans	277 **	3,120	2,630 **	20,975	242 *	6,521
Dry Haricot Beans	419 **	3,711	793 **	5,709	35 *	1,493
Cucumbers	534 **	6,874	14,125 **	86,881	1,105 **	11,843
Squash	439 **	4,048	8,729 **	56,148	657 **	13,215
Sesame	1,182 **	6,681	885 **	5,421	- 13	818
Sunflower	234 *	1,154	330	1,881	- 25	1,646
Peanuts	423 *	11,225	757 *	19,843	3	1,763

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Table III-7. Estimated National Trends in Area, Production and Yield of Nonirrigated Perennial (Fruit) Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change metric tons per 1000 fruit bearing trees	10 Year Average
Grapes	3,343 **	70,630	12,374 *	209,199	.00	1.00
Olives	10,680 **	162,794	11,105 *	136,270	.09	2.70
Apricots	1	1,557	107	2,091	.15	4.20
Apples	1,012 **	5,272	2,045 **	12,104	.27	6.50
Plums	122 **	592	407 **	2,092	.67	6.90
Green Plums	35 *	314	52 **	338	.41 *	3.30
Pomegranates	19	1,004	127	3,485	.10	3.30
Peaches	46 **	178	102 **	396	.52 **	4.10
Figs	- 100	20,349	-1,283	39,245	-.12	3.70

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Table III-8. Estimated National Trends in Area, Production and Yield of Irrigated Perennial (Fruit) Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (metric tons per 1000 fruit bearing trees)	10 Year Average
Grapes	-53	5,488	934	34,185	.10 *	1.20
Olives	175 **	4,239	206	9,567	-.07	4.70
Apricots	153 **	9,096	2,935 *	29,751	.41 **	3.60
Apples	493 **	7,157	3,264 **	29,533	.22 *	5.30
Plums	63 **	1,642	705 **	6,387	.19 *	3.80
Green Plums	90 **	1,615	931 **	6,526	.07	3.10
Pomegranates	156 **	2,561	275	15,362	-.07	3.90
Peaches	134 **	2,085	1,495 **	9,835	.27 *	3.60
Figs	-34 *	909	- 101	3,935	.33 *	5.20

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NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Livestock Trends

Livestock numbers and production of livestock products varied sharply over short spans of years as rainfall and feed supplies varied. Sheep and goat numbers have tended upward, particularly since 1972, but because of wide year to year fluctuations the trend is not statistically significant. Production of wool and goat hair have tended downward but show no persistent trend. In contrast, the number of chickens, cows and calves, which depend primarily on food byproducts, feeds or imported supplies, showed substantial and statistically significant upward trends. Production of eggs reflected the significant upward movement in number of chicken but trends in milk products were mixed with milk and cheese tending upward but butter and ghee declined. All classes of draft animals showed consistent downward trends.

B. Farm Production Costs and Returns

As a part of the sector assessment, a survey of farm holders was conducted during the spring of 1979 for the purpose of (1) estimating costs and returns for all major crops in the various agro-ecological areas of Syria; (2) describing the predominant farming systems in these areas; and (3) evaluating farming operations and identifying factors associated with variations in productivity.

The decision was made to go directly to farm holders and obtain information concerning their management practices, costs and returns. Sampling of holders for this purpose involved the selection of one or more villages within each Resource Planning Unit (RPU), which were chosen to provide as broad a representation of the agriculture in each RPU as possible. The Village Survey List of farm holders in each village, together with the reported number of hectares operated by each, was stratified according to farm size and a random sample of holders was selected from each group. Some 10,000 farm holders and livestock holders with no land occurred on the list, from which a sample of 1,500 holders was drawn for field interviews.

The FAO Farm Management Data Collection and Analysis System (FMDCAS) provided the format for collecting and analyzing the data on farm resources, production costs and returns. All survey questions were directed toward the 1977-1978 crop year. Computer budget printouts were obtained by major crop for individual fields and parcels of land contained within each farm. Use of computer aggregation routine resulted in crop budget printouts for small, medium and large sized farm groups at the RPU level. Subsequently, these budgets were aggregated to type of farming region and national levels for each major crop on the basis of proportions of total land devoted to each crop and the total production from each crop. Costs and returns per dunom for each crop at the RPU, regional and national levels were weighted by the proportion of total dunoms reported in the survey. However, per 100 kg figures were weighted by the proportion of total production reported.

Thus, the per dunom costs and returns figure if converted to a 100 kg basis will not necessarily agree with the 100 kg figures reported, for the proportion of total production for each size group and RPU usually differ from the proportion of dunoms represented in each group.

Variable costs and an estimate of family labor costs, derived on the basis of hired labor wage rates, were calculated. Both gross margin (value of production less variable costs and rent paid), and net earnings (value of production less total costs) are reported. Gross margin represents returns above cash costs, while net earnings represent the return to farm holders' resources and management.

While costs and return for major crops at type of farming region and national level are contained in this report, these figures and further discussions of RPU and farm size differences may be found in Vol. 3 - Agricultural Production Annex, Chapter IV.

Controlled Crops

In analyzing the results of the farm survey particular attention was paid to crops controlled by the government. These crops include wheat, barley, lentils, chickpeas, cotton, sugar beets, tobacco and peanuts. For the most part, these crops require licenses from the government for production. The government announces prices, fixes bonuses, and purchases all or part of the total production. Results of the farm survey may have special implications to the government in planning for production of these crops. However, the survey results contain input-output, costs and returns information for one crop year only, which would be subject to change in subsequent crop years as fluctuations in weather and prices occur, and as improved farming practices are adopted.

Local Wheat

According to the farm survey results, the total cost of producing local wheat in Syria during the 1977-1978 crop year was 47 SL per dunom and 61 SL per 100 kg (Table III-9). Over one-third of the local wheat producers interviewed irrigated their wheat. Unpaid family labor, for which a value was imputed, made up about one-fourth of the total costs, while variable costs, consisting primarily of cash costs, amounted to 34 SL per dunom and 44 SL per 100 kg. The average value of product reported by farm holders was 74 SL per 100 kg, a figure consistent with the government announced prices of 72-77 SL per 100 kg.

Table III-9. Estimated Production Costs and Returns in For Local Wheat
By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) <u>1/</u>	84	6	68	30	88	20	26	24	35
Per Dunom: <u>2/</u>									
Prod. (Kg)	143	82	116	56	143	89	70	55	77
Value of Prod. (SL)	109	58	82	39	114	64	51	40	56
Var. Costs (SL)									
Seed	12	10	9	9	16	10	8	9	10
Org. Fert.	0	1	1	0	0	0	0	1	0
Min. Fert.	5	8	12	2	5	2	1	2	3
Pest.	0	1	0	0	0	0	0	0	0
Pack.	0	2	3	0	6	4	2	1	2
H. Labor	3	6	5	3	7	1	8	4	4
Animal Power	3	5	10	1	1	1	2	1	2
Tractor Power	17	9	8	8	22	11	11	7	11
Other	2	1	1	3	19	1	0	0	2
Total	42	43	49	26	76	30	32	25	34
Rent Paid	55	0	0	0	2	0	1	1	1
Tot. Var. + Rent	97	43	49	26	78	30	33	26	35
Family Labor <u>3/</u>	35	28	15	6	25	2	19	12	12
Total	132	71	64	32	103	32	52	38	47
Gross Margin <u>4/</u>	12	15	33	13	36	34	18	14	21
Net Earnings <u>5/</u>	-23	-13	18	7	11	32	-1	2	9
Per 100 kg (SL): <u>6/</u>									
Value of Prod.	76	71	70	71	80	74	73	74	74
Var. Cost	38	52	51	47	54	33	47	41	44
Var. Cost + Rent	68	52	51	47	55	33	48	42	45
Family Labor <u>3/</u>	17	34	13	11	18	2	27	21	16
Total Cost	85	86	64	58	73	35	75	63	61
Gross Margin <u>4/</u>	8	19	19	24	25	41	25	32	29
Net Earnings <u>5/</u>	-9	-15	6	13	7	39	-2	11	13

1/ Proportion of holders reporting

2/ Weighted by total number of dunoms

3/ Imputed value of unpaid family labor

4/ Value of production less variable cost and rent

5/ Value of production less total cost

6/ Weighted by total production

Seed and tractor power together accounted for over 60 percent of the variable cost items used in local wheat production, while fertilizer and hired labor accounted for about 20 percent of the variable cost.

Gross margin for local wheat production in Syria was 21 SL per dunom, while net earnings, the remainder after subtracting imputed family labor costs, amounted to 9 SL per dunom. On a per 100 kg basis gross margins averaged 29 SL and net earnings 13 SL.

The lowest variable and total costs per 100 kg of producing local wheat was in the Northeast Region at 33 SL and 35 SL respectively. Per dunom variable cost was 30 SL while total cost was 32 SL. This region accounted for 24 percent of the production and 21 percent of the hectare reported in the survey. The relatively high yield of 89 kg per dunom, with only one-fifth of the producers reporting irrigation, was one of the factors leading to lower per 100 kg costs. At the same time the farms of the region are larger and more highly mechanized, as indicated by lower costs for hired and family labor, and relatively high costs for tractor power. Both gross margin and net earnings were higher in this region than any of the others.

The Undulating Plains Region, another important wheat producing region, which accounted for 17 percent of the production and 24 percent of the hectare reported in the survey, experienced the next lowest total costs per 100 kg despite a yield of only 56 kg per dunom. Relatively lower hired and family labor costs, resulting from a high level of mechanized production probably explain this cost of production and higher net earnings situation.

Despite a yield only slightly less than the national average the important wheat producing Southwest Region had relatively high costs of production, resulting in net earnings of -2.SL per 100 kg. High hired and family labor costs, reflecting lower levels of mechanized farming, help explain this relatively unfavorable cost and income result.

Although irrigated local wheat yields were high in the Lowlands and the Euphrates and Tributaries regions, variable costs per 100 kg were higher in these regions than the national average. Family labor costs were also high, leaving both gross margins and net earnings below the national averages.

The Steppe Region, the portion cultivated lying to the northwest near the Undulating Plains or near the Euphrate, with almost one-fourth of the holders reporting irrigation, had a relatively low variable cost of production per 100 kg. However, high family labor costs reduced net earnings to a level below the national average.

The Coastal and Mountain regions produced only a small proportion of national wheat supply, according to survey results. Despite high yields, the high cost of rent paid reduced net earnings in the Coastal Region to -9 SL per 100 kg, and high family labor costs reduced net earnings in the Mountain Region to -5 SL per 100 kg.

By plotting in cumulative fashion the variable and total costs of producing 100 kg of wheat for each RUP against the proportion of total production from each RPU, a useful means is provided for viewing the cost-of-production structure in Syria (Fig. III-1). At the average value of production reported in the survey of 74 SL per 100 kg, over 98 percent of the total production had variable costs of 74 SL or less while 76 percent of the total production was produced at a total cost of less than this price.

The values of local wheat by-products, mainly in the form of straw for sale or the returns from grazing livestock on crop residues, appeared sufficient to offset the imputed value for farm labor. In the Undulating Plains a surplus existed over this value.

Mexican Wheat

Mexican wheat is not so widely planted throughout Syria but accounts for a larger proportion of the irrigated area than local wheat. Yields generally were higher than local wheat (Table III-10). Average production per dunom was 110 kg. The average value per 100 kg of 71 SL was below that for local varieties. Variable costs at the national level both on a per dunom and per 100 kg basis were slightly higher for Mexican Wheat than local wheat at 51 SL and 47 SL respectively. Indicated reason for this difference was the higher expenditures for fertilizer and tractor power. Despite a lower gross margin than for local wheat production nationally, net earnings from Mexican Wheat of 18 SL per 100 kg, resulting from lower family labor costs, were slightly higher than for local wheat.

Variable costs of production per 100 kg in the major Mexican Wheat producing areas, the Northeast and the Lowlands, were similar although the Lowlands made more use of irrigation. The lower price received for wheat by producers in the Lowlands accounted for relatively lower net earnings than the Northeast.

As found from the survey, the Undulating Plains had only a small proportion of total Mexican Wheat production. The yield, of 53 kg per dunom was lower than for the other regions, due in part to lack of irrigation. Low family labor costs resulted in net earnings per 100 kg as high as any region, although per dunom returns were next to the lowest in Syria.



Figure III-1. Cumulation of Local Wheat Production by Cost Levels, Cropyear 1977-1978, SAR

Table III-10. Estimated Production Costs and Returns in For Mexican Wheat
By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) <u>1/</u>	-	0	84	0	100	25	-	4	41
Per Dunom: <u>2/</u>									
Prod. (Kg)	-	72	119	53	229	103	-	99	110
Value of Prod. (SL)	-	52	78	37	171	73	-	67	77
Var. Costs (SL)									
Seed	-	9	9	17	13	9	-	10	9
Org. Fert.	-	0	0	0	0	0	-	0	0
Min. Fert.	-	7	15	2	12	5	-	2	8
Pest.	-	1	2	0	0	0	-	0	1
Pack.	-	1	4	3	7	11	-	2	8
H. Labor	-	5	3	3	2	1	-	0	2
Animal Power	-	0	1	0	1	0	-	0	0
Tractor Power	-	9	19	8	36	15	-	11	17
Other	-	0	1	0	21	8	-	4	6
Total	-	32	54	23	92	49	-	29	51
Rent Paid	-	0	0	0	0	0	-	5	0
Tot. Var. + Rent	-	32	54	23	92	49	-	34	51
Family Labor <u>3/</u>	-	17	9	1	28	4	-	10	8
Total	-	49	63	24	120	53	-	44	59
Gross Margin <u>4/</u>	-	20	24	14	79	24	-	33	26
Net Earnings <u>5/</u>	-	3	15	13	51	20	-	23	18
Per 100 kg (SL): <u>6/</u>									
Value of Prod.	-	72	66	70	75	71	-	68	71
Var. Cost	-	44	49	44	38	47	-	29	47
Var. Cost + Rent	-	44	49	44	38	47	-	34	47
Family Labor <u>3/</u>	-	25	7	1	12	4	-	10	6
Total Cost	-	69	56	45	50	51	-	44	53
Gross Margin <u>4/</u>	-	28	17	26	37	24	-	34	24
Net Earnings <u>5/</u>	-	3	10	25	25	20	-	24	18

1/ Proportion of holders reporting

2/ Weighted by total number of dunoms

3/ Imputed value of unpaid family labor

4/ Value of production less variable cost and rent

5/ Value of production less total cost

6/ Weighted by total production

Neither the Mountain nor the Steppe region produced significant proportions of total Mexican Wheat during 1977-1978. Variable costs per 100 kg were below the national average for each, while producers in the Steppe had the lowest of any region. High family labor costs in each region offset the variable cost advantage in the Steppe, while reducing net earnings in the Mountain Region to the lowest of any region.

The Euphrates and Tributaries Region where all the Mexican Wheat was irrigated had the highest yields, next to the lowest variable costs per 100 kg, and the highest gross margin of any region. High family labor costs reduced net earnings considerably, although these earnings were one of the two highest. However, the proportion of total Mexican Wheat production was very low.

Neither in the Coast nor in the Southwest Region did farm holders interviewed report sufficient Mexican Wheat for costs and returns analysis.

Graphing variable and total costs per 100 kg for each RPU in relation to proportion of total production reveals that over 97 percent of the total production was produced at a total cost of less than the 71 SL average price received per 100 kg (Fig. III-2). Variable costs would be covered on all production at this price.

The value of Mexican Wheat by-products covered family labor imputed costs in all producing regions with the exception of the Steppe, where by-products values were 2 to 5 SL less than family labor costs.

Barley

Barley was produced in all regions (Table III-11). Production was predominantly under rainfed conditions except in the Euphrates and Tributaries Region where half the farm holders reported irrigated production. Average yield nationally was 49 kg per dunom and the average price received was 54 SL per 100 kg. Variable costs amounted to 19 SL per dunom and 40 SL per 100 kg. Gross margins were 85 SL and 14 SL, respectively, while net earnings were 2 SL and 1 SL.

All regions except the Coast, Mountain and Lowlands produced significant proportions of total barley in 1977-1978 according to survey results. The lowest variable and total costs per 100 kg occurred in the Undulating Plains and Northeast, resulting in the highest gross margin and net earnings in Syria. Elsewhere variable costs were not so high, nor value of product produced so low that gross margins per 100 kg were negative. However, when family labor costs were added to variable costs net earnings were negative in all except the Lowlands, Undulating Plains, Euphrates and Northeast. A major factor in these low net earnings was hired labor costs and the imputed value of family labor.

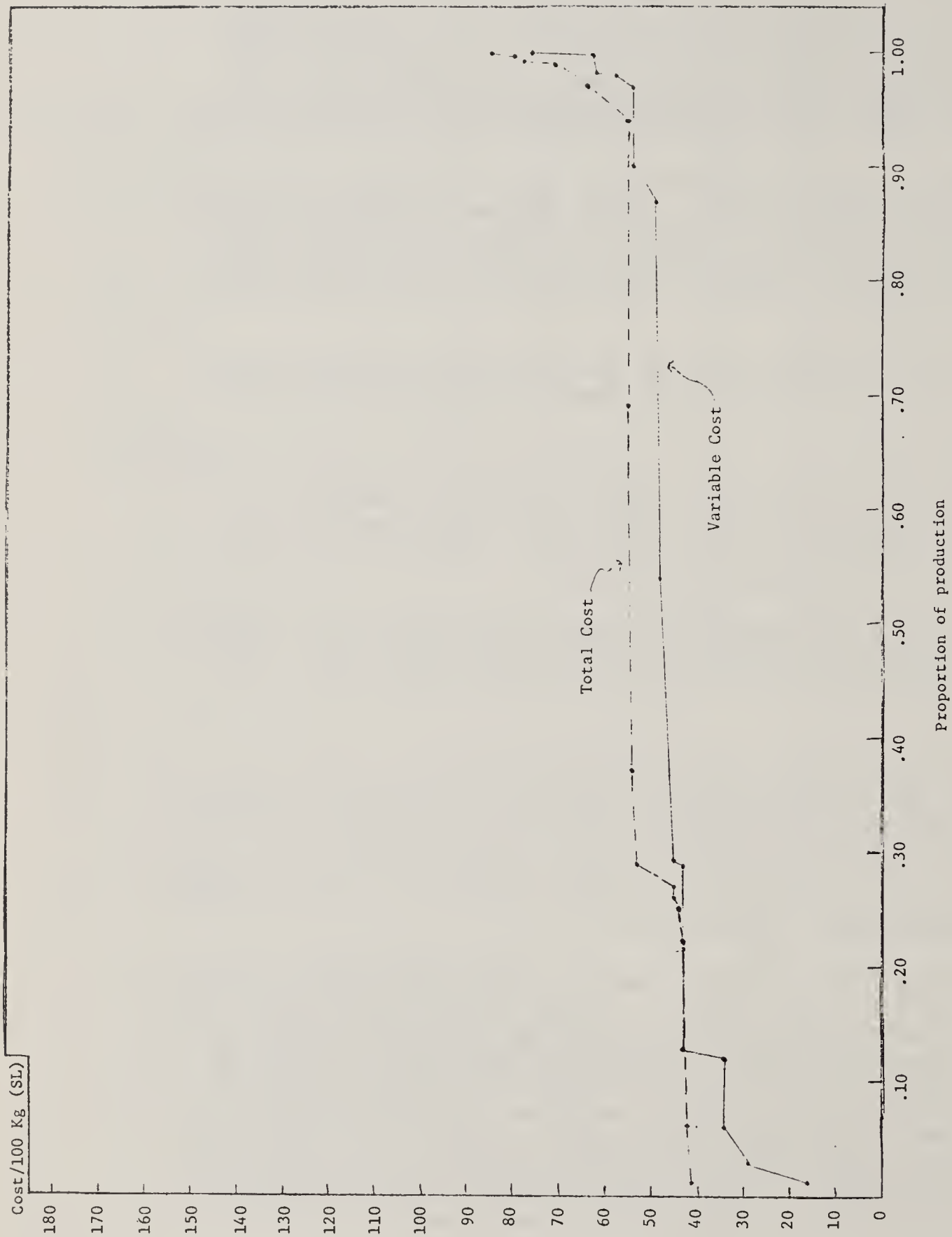


Figure III-2. Cumulation of Mexican Wheat Production by Cost Levels, Cropyear 1977-1978, SAR

Table III-11. Estimated Production Costs and Returns in For Barley
By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) <u>1/</u>	0	12	4	4	50	2	15	11	9
Per Dunom: <u>2/</u>									
Prod. (Kg)	223	74	93	56	75	75	50	26	49
Value of Prod. (SL)	122	61	54	31	40	38	33	14	27
Var. Costs (SL)									
Seed	10	10	6	6	7	6	6	5	6
Org. Fert.	0	0	2	0	0	0	0	0	0
Min. Fert.	16	4	13	1	1	1	0	0	1
Pest.	0	0	0	0	0	0	0	0	0
Pack.	0	2	4	2	4	4	1	1	2
H. Labor	25	12	4	1	1	1	6	2	2
Animal Power	10	3	0	1	1	0	3	0	1
Tractor Power	41	5	10	6	12	11	5	5	6
Other	0	0	0	0	5	2	1	0	1
Total	102	36	39	17	31	25	22	13	19
Rent Paid	0	0	0	0	1	0	0	1	0
Tot. Var. + Rent	102	36	39	17	32	25	22	14	19
Family Labor <u>3/</u>	83	27	14	5	5	2	16	5	6
Total	185	63	53	22	37	27	38	19	25
Gross Margin <u>4/</u>	20	25	15	14	8	13	11	0	8
Net Earnings <u>5/</u>	-63	-2	1	9	3	11	-5	-5	2
Per 100 kg (SL): <u>6/</u>									
Value of Prod.	55	61	58	55	54	50	57	51	54
Var. Cost	46	36	42	32	42	33	44	48	40
Var. Cost + Rent	46	36	42	32	43	33	44	50	40
Family Labor <u>3/</u>	37	27	15	9	7	3	29	17	13
Total Cost	83	63	57	41	50	36	73	67	53
Gross Margin <u>4/</u>	9	25	16	23	11	17	13	1	14
Net Earnings <u>5/</u>	-28	-2	1	14	4	14	-16	-16	1

1/ Proportion of holders reporting

2/ Weighted by total number of dunoms

3/ Imputed value of unpaid family labor

4/ Value of production less variable cost and rent

5/ Value of production less total cost

6/ Weighted by total production

While variable cost for 90 percent of the total barley production would be covered at the average price received for barley of 54 SL per 100 kg, only 72 percent of the production would have total costs covered at this price (Fig. III-3).

Barley crop residues cover imputed family labor costs in all except the Coastal Region and equalled about twice the values of family labor in the Southwest and Steppe Region.

Lentils

According to farm survey tabulations the regions where most of the lentils were produced include the Lowlands, Northeast, Undulating Plains and Mountains. Although farm holders in the Southwest reported a significant proportion of the nation's total land planted to lentils, yields were so low that lentil production appeared relatively insignificant. On a nation-wide basis lentil yields averaged 69 kg per dunom and the average price reported was 83 SL per 100 kg (Table III-12). Variable costs and total costs per dunom averaged 44 SL and 52 SL, respectively. Variable and total costs per 100 kg averaged 71 SL and 84 SL. Nation-wide, per dunom and per 100 kg average returns just equalled or fell slightly below total cost.

Both variable costs and total cost per 100 kg were lower in the major lentil producing regions than in other regions, except for the Northeast, where variable costs were higher due primarily to high hired labor costs. Only producers in the Southwest and Steppe regions had negative gross margins per 100 kg while producers in the major lentil producing regions received positive gross margins.

Only in the Euphrates and Tributaries Region were lentils irrigated to any large extent, although the proportion of total lentils produced in this region was relatively small. Costs of production were higher per dunom than for other regions because of the high irrigation cost reflected in imputed family labor and other costs. However yields were not high enough to reduce per 100 kg costs below that of the major producing areas. High family labor costs reduced net earnings to a negative level.

Results of plotting on a graph the proportions of total lentil production produced at the various cost level by RPU are found in Fig. III-4. According to these estimates, about 95 percent of the total production was produced at a variable cost of 83 SL or less, the average price received for lentils by farm holders surveyed. However, only about 72 percent of the total production was produced at a total cost of 83 SL or less, reflecting a rather high usage of family labor.

The value of lentil-by products generally doubled the imputed family labor costs in all producing regions except for the Coast, Euphrates and Tributaries, and Steppe regions where the family labor costs about equalled the by-product values.

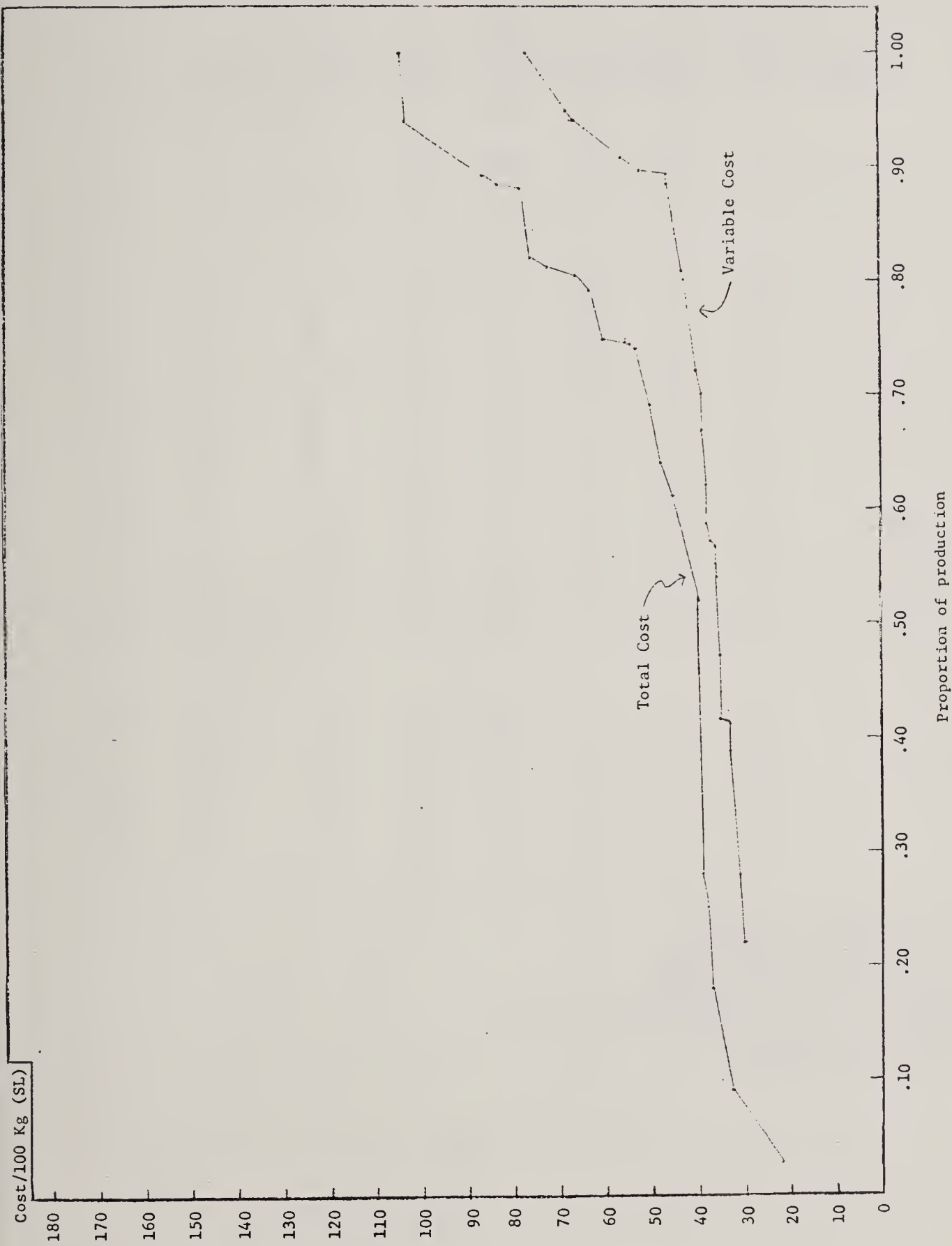


Figure III-3. Cumulation of Barley Production by Cost Levels, Cropyear 1977-1978, SAR

Table III-12. Estimated Production Costs and Returns in For Lentils
By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) <u>1/</u>	-	0	0	0	100	3	0	3	2
Per Dunom: <u>2/</u>									
Prod. (Kg)	-	62	58	87	103	90	24	50	69
Value of Prod. (SL)	-	51	47	74	87	76	20	43	52
Var. Costs (SL)									
Seed	-	13	7	11	10	12	7	7	9
Org. Fert.	-	0	0	6	0	5	0	0	1
Min. Fert.	-	10	6	2	0	2	0	0	5
Pest.	-	1	2	0	0	0	0	0	1
Pack.	-	2	2	2	3	3	0	0	2
H. Labor	-	14	13	23	12	31	9	27	16
Animal Power	-	2	2	4	7	4	3	4	3
Tractor Power	-	5	4	7	11	7	2	10	5
Other	-	0	3	0	34	1	0	20	2
Total	-	47	39	55	77	65	21	68	44
Rent Paid	-	0	0	0	0	0	0	0	0
Tot. Var. + Rent	-	47	39	55	77	65	21	68	44
Family Labor <u>3/</u>	-	32	3	8	39	6	6	15	8
Total	-	79	42	63	116	71	27	83	52
Gross Margin <u>4/</u>	-	4	8	19	10	11	-1	-25	8
Net Earnings <u>5/</u>	-	-28	5	11	-29	5	-7	-40	0
Per 100 kg (SL): <u>6/</u>									
Value of Prod.	-	81	83	85	85	85	85	85	83
Var. Cost	-	75	69	63	76	73	87	135	71
Var. Cost + Rent	-	75	69	63	76	73	87	135	71
Family Labor <u>3/</u>	-	51	4	9	38	6	28	30	13
Total Cost	-	126	73	72	114	79	115	164	84
Gross Margin <u>4/</u>	-	6	14	22	9	12	-2	-50	12
Net Earnings <u>5/</u>	-	-45	10	13	-29	6	-30	-80	-1

1/ Proportion of holders reporting

2/ Weighted by total number of dunoms

3/ Imputed value of unpaid family labor

4/ Value of production less variable cost and rent

5/ Value of production less total cost

6/ Weighted by total production

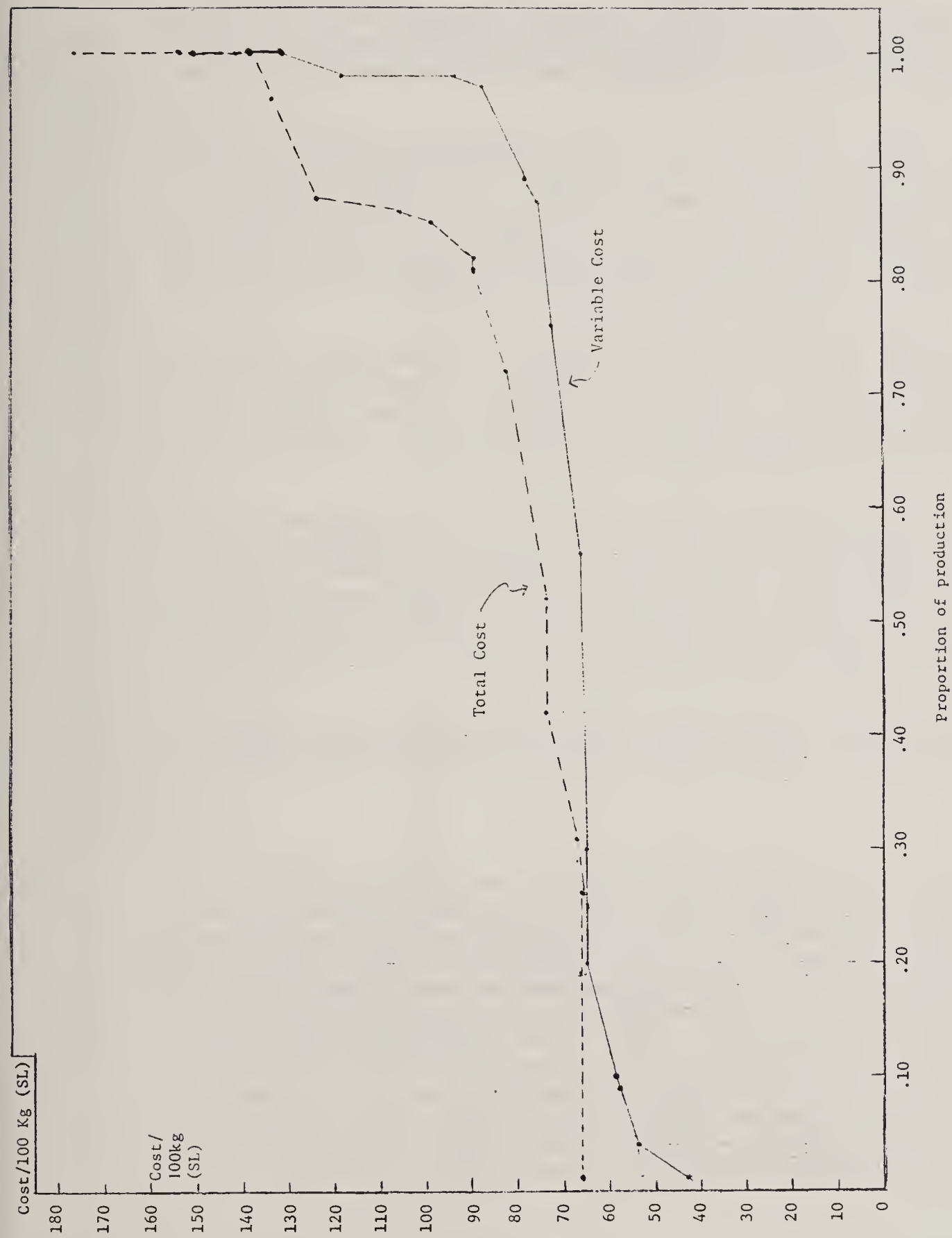


Figure III-4. Cumulation of Lentils Production by Cost Levels, Cropyear 1977-1978, SAR

Chickpeas

Only the Mountain, Lowlands and Southwest regions produced chickpeas to any significant extent, according to farm survey results. On the basis of total production, the Southwest was the most important chickpea producing region by far, (Table III-13).

Produced almost totally under rainfed conditions, chickpea yields at the national level average 58 kg per dunom. The average price holders received per 100 kg was 312 SL, about double the government announced price, and government purchases amounted to less than one percent of total production. Total variable costs for the nation was 51 SL per dunom and 112 SL per 100 kg, resulting in exceptionally high gross margins and net earnings of 224 SL and 209 SL per 100 kg, respectively.

Both variable and total costs of producing chickpeas were lowest per 100 kg among producers in the Southwest. Similarly gross margins and net earnings were highest. Although net earnings were about half as much in the other two regions resulting mainly from the lower yields and value per 100 kg, the returns still appear to be quite high.

According to the graph of the proportion of total chickpeas produced at different levels of variable and total costs it is apparent that government announced prices and prices received by producers greatly exceeded these costs, (Fig. III-5). Even two-thirds of the government announced price of 165 SL per 100 kg, over 80 percent of the total production would have its variable costs covered, although only about 60 percent of the total product on would have its total costs covered.

Chickpea by-product value reportedly existed in only the Southwest Region, where they were slightly less than the imputed value of family labor.

Cotton

Almost all of the cotton produced by the farm holders surveyed was irrigated (Table III-14). While some cotton was produced in all regions except the Coast and Mountains, the bulk of the production came from the Euphrates and Tributaries Region and the Northeast. For the nation as a whole cotton yields were 235 kg per dunom, with an average reported value of 155 SL per 100 kg. The high variable costs per dunom reflect higher uses of fertilizers and pesticides than for any other crops except sugar beets. Tractor and hired labor costs also were quite high, resulting in a total variable cost of 159 SL per dunom and 66 SL per 100 kg. Adding in rent paid and the estimated value of unpaid family labor resulted in total costs of 220 SL per dunom and 91 SL per 100 kg. Net earnings at the national level amounted to 162 SL per dunom and 64 SL per kg.

Table III-13. Estimated Production Costs and Returns in For Chickpeas
By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) <u>1/</u>	-	0	0	-	-	-	0	-	0
Per Dunom: <u>2/</u>									
Prod. (Kg)	-	36	44	-	-	-	71	-	58
Value of Prod. (SL)	-	89	92	-	-	-	225	-	172
Var. Costs (SL)									
Seed	-	18	18	-	-	-	25	-	22
Org. Fert.	-	0	0	-	-	-	0	-	0
Min. Fert.	-	7	5	-	-	-	0	-	3
Pest.	-	0	1	-	-	-	0	-	0
Pack.	-	2	2	-	-	-	1	-	1
H. Labor	-	13	10	-	-	-	9	-	10
Animal Power	-	0	0	-	-	-	3	-	2
Tractor Power	-	4	5	-	-	-	13	-	10
Other	-	0	0	-	-	-	3	-	2
Total	-	44	41	-	-	-	54	-	50
Rent Paid	-	0	0	-	-	-	2	-	1
Tot. Var. + Rent	-	44	41	-	-	-	56	-	51
Family Labor <u>3/</u>	-	3	4	-	-	-	13	-	9
Total	-	47	45	-	-	-	69	-	60
Gross Margin <u>4/</u>	-	45	51	-	-	-	169	-	121
Net Earnings <u>5/</u>	-	42	47	-	-	-	156	-	112
Per 100 kg (SL): <u>6/</u>									
Value of Prod.	-	249	211	-	-	-	335	-	312
Var. Cost	-	122	93	-	-	-	76	-	121
Var. Cost + Rent	-	122	93	-	-	-	79	-	112
Family Labor <u>3/</u>	-	8	6	-	-	-	18	-	15
Total Cost	-	130	99	-	-	-	97	-	127
Gross Margin <u>4/</u>	-	127	118	-	-	-	256	-	224
Net Earnings <u>5/</u>	-	119	112	-	-	-	238	-	209

1/ Proportion of holders reporting

2/ Weighted by total number of dunoms

3/ Imputed value of unpaid family labor

4/ Value of production less variable cost and rent

5/ Value of production less total cost

6/ Weighted by total production

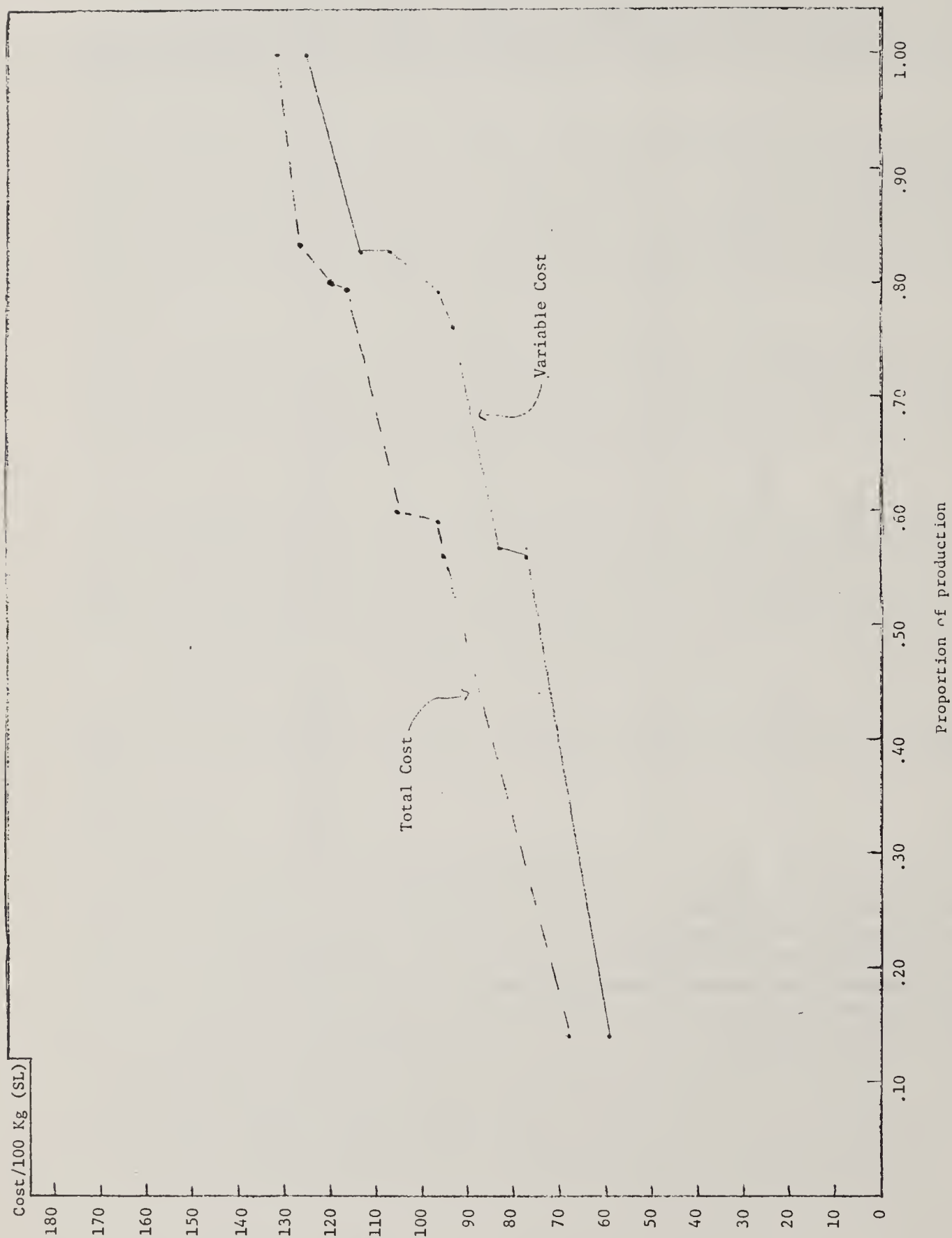


Figure III-5. Cumulation of Chickpeas Production by Cost Levels, Cropyear 1977-1978, SAR

Table III-14. Estimated Production Costs and Returns in For Cotton
By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) <u>1/</u>	-	-	99	100	100	100	100	100	100
Per Dunom: <u>2/</u>									
Prod. (Kg)	-	-	147	246	265	204	260	218	235
Value of Prod. (SL)	-	-	238	400	411	392	432	329	382
Var. Costs (SL)									
Seed	-	-	5	7	7	6	3	6	6
Org. Fert.	-	-	2	8	1	0	0	4	1
Min. Fert.	-	-	37	30	30	26	15	20	29
Pest.	-	-	4	6	4	4	15	7	5
Pack.	-	-	5	7	9	9	14	8	8
H. Labor	-	-	40	81	32	36	40	27	35
Animal Power	-	-	8	18	5	4	4	6	5
Tractor Power	-	-	27	5	23	41	29	35	26
Other	-	-	65	66	47	30	57	12	44
Total	-	-	193	228	158	156	177	125	159
Rent Paid	-	-	0	2	3	0	0	0	2
Tot. Var. + Rent	-	-	193	230	161	156	177	125	161
Family Labor <u>3/</u>	-	-	45	23	51	96	82	66	59
Total	-	-	238	253	212	252	259	191	220
Gross Margin <u>4/</u>	-	-	45	170	250	236	255	204	221
Net Earnings <u>5/</u>	-	-	0	147	199	140	173	138	162
Per 100 kg (SL): <u>6/</u>									
Value of Prod.	-	-	162	162	155	149	166	158	155
Var. Cost	-	-	132	89	60	59	68	58	66
Var. Cost + Rent	-	-	132	93	61	59	68	58	67
Family Labor <u>3/</u>	-	-	30	10	19	34	31	30	24
Total Cost	-	-	162	103	80	93	99	88	91
Gross Margin <u>4/</u>	-	-	30	69	94	90	98	100	88
Net Earnings <u>5/</u>	-	-	0	59	75	56	67	70	64

1/ Proportion of holders reporting

2/ Weighted by total number of dunoms

3/ Imputed value of unpaid family labor

4/ Value of production less variable cost and rent

5/ Value of production less total cost

6/ Weighted by total production

Total cost of production per 100 kg was lower in the Euphrates and Tributaries Region than in other regions while net earnings per kg were highest. The Northeast fared somewhat less well, accounted for in part by higher family labor cost. While producers in the Steppe earned the next highest level of net earnings per 100 kg, cotton production here relative to total production was quite low.

Low yields in the Lowlands resulted in high per 100 kg costs of production and the lowest gross margins and net earnings of all the cotton producing regions.

A look at the graph where the proportion of cotton production produced at different cost levels reveals that the government announced price of 183 SL per 100 kg of seed cotton considerably exceeded costs of production in all areas (Fig. III-6). A price two-thirds this level would cover the variable costs of over 96 percent of the total cotton production and the total costs of about 91 percent of the total production.

Cotton by-product values were considerably less than imputed family labor costs in all producing regions except the Undulating Plains where the two were about equal. These values were about half the family labor costs in the Euphrates and Tributaries Region, one third in the Steppe, one fourth in the Southwest, and only one-tenth in the Northeast.

Sugar Beets

While sugar beet production reported in the farm survey encompassed three regions, the Lowlands and Euphrates and Tributaries Regions produced most all of the total production reported. Grown under irrigation, sugar beet yields averaged 2330 kg per dunom, with the average price per 100 kg being 11 SL, somewhat less than the government announced price. Variable costs included proportionally high expenditures for fertilizer as compared with other crops. Variable cost totalled 223 SL per dunom and 10 SL per 100 kg at the national level, with total costs of 345 SL and 14 SL, respectively. Gross margin per dunom was 59 SL and per 100 kg was one SL, and net earnings were -63 SL and -3 SL, respectively. (Table III-15).

While the Euphrates and Tributaries Region had the lowest variable costs per 100 kg, family labor costs increased total costs to a higher level than the other two regions. Value of production per 100 kg was also highest in this region, as was gross margin, although net earnings per 100 kg were negative.

Sugar beet by-product values were reported at 5-7 SL per dunom in the Lowlands Region, much less than family labor charges. About 20 SL per dunom was the value reported in the Euphrates and Tributaries Region, still much less than the family labor charge. In the Steppe by-product value was a reported 35 SL per dunom.

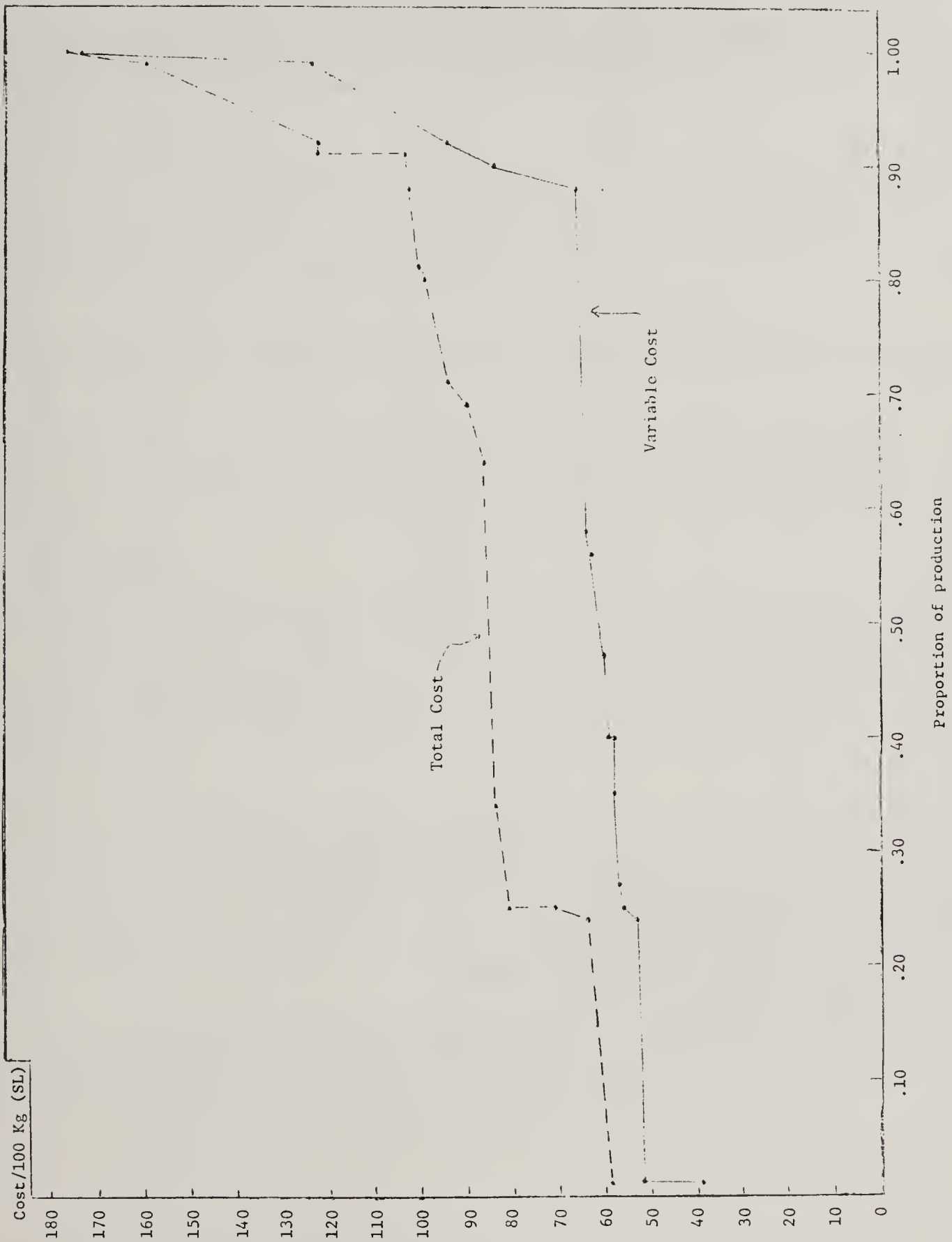


Figure III-6. Cumulation of Cotton Production by Cost Levels, Cropyear 1977-1978, SAR

Table III-15. Estimated Production Costs and Returns in For Sugar Beets
By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) <u>1/</u>	-	-	100		100	-	-	100	100
Per Dunom: <u>2/</u>									
Prod. (Kg)	-	-	2548		1938	-	-	2000	2330
Value of Prod. (SL)	-	-	298		252	-	-	240	282
Var. Costs (SL)									
Seed	-	-	13		4	-	-	30	10
Org. Fert.	-	-	0		0	-	-	0	0
Min. Fert.	-	-	54		121	-	-	21	77
Pest.	-	-	5		0	-	-	0	3
Pack.	-	-	0		0	-	-	0	0
H. Labor	-	-	107		0	-	-	53	69
Animal Power	-	-	42		0	-	-	0	27
Tractor Power	-	-	15		12	-	-	38	14
Other	-	-	28		15	-	-	98	23
Total	-	-	264		148	-	-	240	223
Rent Paid	-	-	0		0	-	-	0	0
Tot. Var. + Rent	-	-	264		148	-	-	240	223
Family Labor <u>3/</u>	-	-	110		146	-	-	0	122
Total	-	-	374		294	-	-	240	345
Gross Margin <u>4/</u>	-	-	34		104	-	-	0	59
Net Earnings <u>5/</u>	-	-	-76		-42	-	-	0	-63
Per 100 kg (SL): <u>6/</u>									
Value of Prod.	-	-	11		13	-	-	12	11
Var. Cost	-	-	10		7	-	-	12	10
Var. Cost + Rent	-	-	10		7	-	-	12	10
Family Labor <u>3/</u>	-	-	4		8	-	-	0	4
Total Cost	-	-	14		15	-	-	12	14
Gross Margin <u>4/</u>	-	-	1		6	-	-	0	1
Net Earnings <u>5/</u>	-	-	-3		-2	-	-	0	-3

1/ Proportion of holders reporting

2/ Weighted by total number of dunoms

3/ Imputed value of unpaid family labor

4/ Value of production less variable cost and rent

5/ Value of production less total cost

6/ Weighted by total production

Tobacco

Survey results indicate that most of the tobacco was grown in the Mountain Region, with only about 10 percent of the operators reporting irrigation (Table III-16). National cost and returns figures, heavily weighted both in area planted and in total production in the Mountain Region resulted in practically the same costs and returns for the Mountain region and for the Nation.

Tobacco yield per dunom in the Mountain Region amounted to 65 kg valued at 659 SL per 100 kg. Variable costs totalled 134 SL per dunom and 207 SL per 100 kg. Seed, fertilizer and pesticides were important components of variable costs. Family labor costs per 100 kg exceeded variable costs, the combined total being 541 SL.

Gross margin per 100 kg from tobacco production in the Mountain Region was 452 SL, while the relatively high family labor cost reduced net earnings to 118 SL per 100 kg.

Per dunom yields of tobacco were much higher for the irrigated farms in the Coast, as were variable and total costs, however, net earnings per 100 kg were slightly less than for farms in the Mountain Region. Net earnings per 100 kg in the Lowlands were the lowest of the three regions.

Peanuts

Peanuts, according to the farm survey results, were produced almost wholly in the Coast Region, although a few farm holders interviewed in the Steppe raised peanuts. All the holders reporting peanut enterprises used irrigation water (Table III-17). Yields, costs and returns in the Coast closely paralleled those in the Nation as a whole, for the Steppe had such a small proportion of the total dunoms and total production of peanuts.

Yields per dunom in the Coast amounted to 130 kg, with value of production being 222 SL per 100 kg. Total variable cost per dunom was 177 SL per dunom, including relatively high expenditures for seed, fertilizer, animal power, and other costs items. Adding in family labor costs resulted in a total cost per dunom of 267 SL. Resulting gross margins were 96 SL per dunom and 74 SL per 100 kg, while net earnings were 18 SL per dunom and 15 SL per 100 kg.

Although peanut yields, in the Steppe were higher than those in the Coast, and variable costs were lower per dunom and per kg, family labor costs were high enough to offset this advantage. This is revealed in the higher gross margins in the Steppe and the lower net earnings.

Table III-16. Estimated Production Costs and Returns in For Tobacco
By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) <u>1/</u>	100	10	33	-	-	-	-	-	11
Per Dunom: <u>2/</u>									
Prod. (Kg)	217	65	33	-	-	-	-	-	67
Value of Prod. (SL)	1302	427	546	-	-	-	-	-	437
Var. Costs (SL)									
Seed	63	47	50	-	-	-	-	-	47
Org. Fert.	0	0	0	-	-	-	-	-	0
Min. Fert.	33	18	30	-	-	-	-	-	18
Pest.	0	5	2	-	-	-	-	-	5
Pack.	16	2	0	-	-	-	-	-	2
H. Labor	13	20	40	-	-	-	-	-	20
Animal Power	65	27	0	-	-	-	-	-	27
Tractor Power	16	6	0	-	-	-	-	-	6
Other	48	9	10	-	-	-	-	-	10
Total	254	134	132	-	-	-	-	-	135
Rent Paid	0	0	0	-	-	-	-	-	0
Tot. Var. + Rent	254	134	132	-	-	-	-	-	135
Family Labor <u>3/</u>	809	216	326	-	-	-	-	-	223
Total	1063	350	458	-	-	-	-	-	358
Gross Margin <u>4/</u>	1048	293	414	-	-	-	-	-	302
Net Earnings <u>5/</u>	239	77	88	-	-	-	-	-	79
Per 100 kg (SL): <u>6/</u>									
Value of Prod.	600	659	552	-	-	-	-	-	655
Var. Cost	117	207	133	-	-	-	-	-	202
Var. Cost + Rent	117	207	133	-	-	-	-	-	202
Family Labor <u>3/</u>	373	334	329	-	-	-	-	-	335
Total Cost	490	541	462	-	-	-	-	-	537
Gross Margin <u>4/</u>	483	452	419	-	-	-	-	-	453
Net Earnings <u>5/</u>	110	118	90	-	-	-	-	-	118

1/ Proportion of holders reporting

2/ Weighted by total number of dunoms

3/ Imputed value of unpaid family labor

4/ Value of production less variable cost and rent

5/ Value of production less total cost

6/ Weighted by total production

Table III-17. Estimated Production Costs and Returns in For Peanuts
By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) <u>1/</u>	100	-	-	-	-	-	-	100	100
Per Dunom: <u>2/</u>									
Prod. (Kg)	130	-	-	-	-	-	-	174	133
Value of Prod. (SL)	285	-	-	-	-	-	-	289	285
Var. Costs (SL)									
Seed	49	-	-	-	-	-	-	48	49
Org. Fert.	0	-	-	-	-	-	-	0	0
Min. Fert.	31	-	-	-	-	-	-	12	30
Pest.	1	-	-	-	-	-	-	0	1
Pack.	0	-	-	-	-	-	-	7	0
H. Labor	1	-	-	-	-	-	-	0	
Animal Power	25	-	-	-	-	-	-	8	24
Tractor Power	7	-	-	-	-	-	-	5	7
Other	63	-	-	-	-	-	-	44	62
Total	177	-	-	-	-	-	-	124	174
Rent Paid	12	-	-	-	-	-	-	0	11
Tot. Var. + Rent	189	-	-	-	-	-	-	124	185
Family Labor <u>3/</u>	78	-	-	-	-	-	-	166	84
Total	267	-	-	-	-	-	-	290	269
Gross Margin <u>4/</u>	96	-	-	-	-	-	-	165	100
Net Earnings <u>5/</u>	18	-	-	-	-	-	-	- 1	16
Per 100 kg (SL): <u>6/</u>									
Value of Prod.									
Var. Cost	222	-	-	-	-	-	-	166	217
Var. Cost + Rent	139	-	-	-	-	-	-	71	133
Family Labor <u>3/</u>	148	-	-	-	-	-	-	71	141
Total Cost	59	-	-	-	-	-	-	96	62
Gross Margin <u>4/</u>	207	-	-	-	-	-	-	167	203
Net Earnings <u>5/</u>	74	-	-	-	-	-	-	95	76
	15	-	-	-	-	-	-	-1	14

1/ Proportion of holders reporting

2/ Weighted by total number of dunoms

3/ Imputed value of unpaid family labor

4/ Value of production less variable cost and rent

5/ Value of production less total cost

6/ Weighted by total production

Uncontrolled Crops

The remainder of the crops on which costs and returns data were obtained during the farm survey are those for the most part uncontrolled by the government. These crops have been grouped in this analysis into vegetable crops, tree and vine crops, and other crops. In the survey none of these crops appeared with any regularity in more than five regions. The number of observations in any region for each crop was limited and details on inputs were scanty. However, the information on variable and total costs and on returns indicates relative feasibility of some alternative enterprises in some regions.

Vegetable Crops

Most all vegetable crops recorded during the farm survey were irrigated (Table III-18). Exceptions included watermelons in all regions, cucumbers in the Undulating Plains, and potatoes in the Mountain Region.

Dry onions produced under irrigation according to survey results, appeared mainly in the Lowlands and Steppe, and to a lesser extent in the Coast Region. Producers in the Coast had the highest yields, and lowest variable and total costs of production, resulting in exceptionally high returns per dunom.

Cucumbers appeared in importance primarily in the Coast and Undulating Plains, although most of the land in cucumbers as estimated from the survey, occurred in the Coast Region. Yields costs and returns were highest per dunom for the largely irrigated Coastal production than for production in the Undulating Plains.

Tomatoes, with from 38 percent to 100 percent of the producers reporting irrigation of this crop, occurred with some regularly in five regions, although most of the land in tomatoes was located in the Southwest, Euphrates and Tributaries Region, and the Coast. Highest per dunom variable costs were found in the Southwest, while highest total costs, related to high imputed family labor costs, were found in the Euphrates and Tributaries Region. Only among producers in the Steppe were variable costs not covered by value of product sold, while both in this region and in the Mountain Region net earnings were negative. Highest net earnings were received by producers in the Southwest.

Potatoes were grown, according to survey results, in the Undulating Plains, Southwest and Lowlands region, and occurred only incidentally in the Mountain Region. Highest variable and total costs, reflecting irrigation, were experienced by producers in the Southwest although the higher prices received and higher yields resulted in gross margin and net earnings being the highest of the four regions. The Undulating Plains with the next highest yield was the only other region in which producers received positive net earnings. Lower yields despite irrigation and lower prices received created a considerable loss for farm holders in the Lowlands.

Table III-18. Estimated Production Costs and Returns for Vegetable Crops
By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irriga- tion <u>1/</u>	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of		Gross Margin <u>3/</u>	Net Earnings <u>4/</u>
					Family Labor <u>2/</u>	Total Cost		
<u>S.L. Per Dunom <u>5/</u></u>								
<u>Dry Onions:</u>								
Coastal	100	2478	1487	364	62	426	1123	1061
Lowlands	100	1988	696	526	48	574	170	122
Steppe	100	962	656	465	87	552	191	104
<u>Cucumbers:</u>								
Coastal	84	758	518	261	145	406	257	112
Undul. Pl.	0	225	153	30	67	97	123	56
<u>Tomatoes:</u>								
Coastal	75	1927	1155	441	250	691	714	464
Mountain	38	474	249	104	200	304	145	-55
Euph. & T.	100	1977	1180	395	617	1012	785	168
Southwest	100	2698	1092	497	112	609	595	483
Steppe	100	648	277	282	32	314	- 5	-37
<u>Potatoes:</u>								
Mountain	0	113	96	43	94	137	53	-41
Lowlands	100	377	245	467	85	552	-222	-307
Undul. Pl.	100	609	435	340	62	402	95	33
Southwest	66	684	1012	712	172	884	300	128
<u>Eggplant:</u>								
Coastal	100	1898	813	617	363	980	196	-167
Mountain	100	997	381	181	276	457	200	- 76

(Continued)

Table III-18. (CONT) Estimated Production Costs and Returns for Vegetable Crops
By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irriga- tion <u>1/</u>	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of		Gross Margin <u>3/</u>	Net Earnings <u>4/</u>
					Family Labor <u>2/</u>	Total Cost		
S.L. Per Dunom <u>5/</u>								

Watermelons:

Mountain	0	81	23	16	22	38	7	-15
Lowlands	0	190	43	16	15	31	27	12
Undul. Pl.	0	292	57	21	7	28	36	29

- 1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Eggplants, all produced under irrigation, appeared to be significant only in the Coast and Mountain regions, with the Coast having about twice the land area in eggplants. Yields in the Coast were about double those of the Mountain Region. While gross margins were relatively high in both regions, high imputed values for family labor resulted in negative net earnings for both sets of producers.

Watermelons, important in the Mountain, Lowlands and Undulating Plains regions, were produced without irrigation. Yields were highest in the Undulating Plains, as were variable costs per dunom. These higher yields and lower family labor costs resulted in higher returns for these producers than for those in the other regions. Producers in the Mountain Region, with the lowest yields and highest family labor costs per dunom, received the lowest returns.

Tree and Vine Crops

Grapes, irrigated to any extent only in the Steppe, were recorded during the farm survey in four regions (Table III-19). Most of the land devoted to grape production occurred in the Southwest and Undulating Plains, and to a lesser extent in the Steppe and Mountain regions. Yields were highest in the Steppe, as were cost and returns. The more important grape producing region, the Southwest, experienced the next highest yields, costs and subsequently returns. Lowest returns were received by producers in the Undulating Plains, mainly because of the low yield.

Olives, more widely distributed than any of the tree and vine crops, occurred most significantly in the Lowlands and Mountains, and to a lesser extent in the Coastal, Undulating Plains and Southwest. Only in the Southwest were olive orchards irrigated to any extent. Yields were highest in the Coastal and Southwest regions, which had the highest costs but also the highest gross margin and net earnings per dunom. Higher prices received for olives in these regions also enhanced returns. Lowest returns per dunom were received by producers in the Mountain and Undulating Plains regions, which had the lowest yields.

Figs, produced mainly in four regions as revealed in the survey results, were of more frequent occurrences in the Southwest, Undulating Plains and Mountains than in the Coastal Region. Yields reported in all regions were quite comparable. Despite higher family labor costs per dunom yields were high enough and variable costs low enough to obtain the highest net earnings in the Southwest. Relatively low variable cost per dunom and low family labor costs, together with the slightly higher prices received, result in the next highest net earnings for producers in the Coastal Region. Only in the Undulating Plains, with the lowest price received for figs, the highest variable cost, and the next highest family labor costs were net earnings negative.

Table III-19. Estimated Production Costs and Returns for Tree and Vine
By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irriga- tion <u>1/</u>	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of		Gross Margin <u>3/</u>	Net Earnings <u>4/</u>
					Family Labor <u>2/</u>	Total Cost		
<u>S.L. Per Dunom <u>5/</u></u>								
<u>Grapes:</u>								
Mountain	0	38	27	11	19	30	16	-3
Undul. Pl.	1	70	34	24	10	34	10	0
Southwest	0	223	187	27	36	63	160	124
Steppe	26	365	401	142	102	244	259	157
<u>Olives:</u>								
Coastal	0	155	294	55	39	94	239	200
Mountain	0	66	106	32	36	68	74	38
Lowlands	35	234	233	49	10	59	184	174
Undul. Pl.	3	39	73	25	30	55	48	18
Southwest	54	96	291	43	34	77	248	214
<u>Figs:</u>								
Coastal	100	134	134	42	12	54	92	80
Mountain	16	135	121	62	43	105	59	16
Undul. Pl.	0	163	138	101	44	145	37	-7
Southwest	0	181	175	36	52	88	139	87
<u>Apples:</u>								
Southwest	100	151	289	141	69	210	148	79
<u>Apricots:</u>								
Mountain	0	241	308	224	58	282	84	26
Southwest	100	310	242	126	104	230	116	12
Steppe	100	391	241	112	92	204	129	37

(Continued)

Table III-19. (CONT) Estimated Production Costs and Returns for Tree and Vine
By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irriga- tion <u>1/</u>	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of		Gross Margin <u>3/</u>	Net Earnings <u>4/</u>
					Family Labor <u>2/</u>	Total Cost		
S.L. Per Dunom <u>5/</u>								
<u>Lemons:</u>								
Coastal	0	571	571	339	143	482	232	89
Lowlands	95	299	265	211	23	234	54	31

- 1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Apples were reported to any significant degree during the farm survey only in the Southwest. All producers surveyed reported irrigation for their apple orchards. Although no comparison can be made here among regions in apple production costs and returns, the returns appear to be suitable.

Apricots were reported during the survey primarily in the Southwest and to lesser extents in the Mountain and Steppe regions. With irrigation being practiced in the Southwest and Steppe, yields were consequently higher, although costs per dunom were lower. Net earnings per dunom were highest in the Steppe, while net returns were next highest in the Mountains despite the highest costs per dunom, mainly because the price received for apricots was higher than prices received in the other two regions.

Lemons, the only citrus fruit to show up in the survey of any consequence, appeared to be a significant enterprise in both the Coastal and Lowlands regions, while most of the land in lemon trees occurred in the Lowlands. Lemon groves in the Lowlands for the most part were irrigated, although yields in the Coastal Region were considerably higher. The higher yield and the higher price received despite higher costs per dunom, resulted in much higher returns to producers in the Coastal Region.

Other Crops

Although cost and returns information were gathered on a number of other crops only bitter vetch, sesame and maize were reported insufficient abundance to warrant budgeting.

Rainfed production of bitter vetch occurred in the Undulating Plains, Southwest and Steppe, the Southwest being the most widely planted region (Table III-20). Despite lower yields, higher prices for bitter vetch in the Steppe and lower costs resulted in the a positive net earnings only in the Steppe.

Sesame, produced in the Euphrates and Tributaries Region primarily, but also in the Mountain Region, for the most part irrigated, had relatively low production costs and highly favorably gross margins and net returns.

Maize costs and return information were gathered primarily in the Lowlands, although some data were taken also in the Southwest and the Steppe regions. All maize producers interviewed reported irrigated production of this crop. Costs were considerably higher on a per dunom basis in the Lowlands and the Steppe, and although yields were highest in the Lowlands, producers in both regions experienced positive gorss margin but negative net margins. Only producers in the Southwest, with lower costs per dunom, received positive net earnings.

Table III-20. Estimated Production Costs and Returns for Other Crops
By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irriga- tion <u>1/</u>	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of		Gross Margin <u>3/</u>	Net Earnings <u>4/</u>
					Family Labor <u>2/</u>	Total Cost		
S.L. Per Dunom <u>5/</u>								
<u>Bitter Vetch:</u>								
Undul. Pl.	0	61	30	33	42	75	- 3	-45
Southwest	0	37	34	34	30	64	0	-30
Steppe	0	33	41	8	25	33	33	8
<u>Sesame:</u>								
Mountain	48	48	190	32	48	80	158	110
Euph. & T.	100	51	205	37	32	69	168	136
<u>Maize:</u>								
Lowlands	100	201	160	122	70	192	38	-32
Southwest	100	137	111	32	61	93	79	18
Steppe	100	94	102	43	136	179	59	-77

1/ Proportion of holders reporting

2/ Imputed value of unpaid family labor

3/ Value of production less variable cost

4/ Value of production less total cost

5/ Weighted by total number of dunoms

C. Comparative Returns and Potential Adjustments

Highlights of potential crop adjustments in response to relative returns are discussed in this section. Mention is made of limitations to these adjustments posed by crop suitabilities and by governmental control programs. Another consideration is that the costs and returns data used are the results of only the one crop year, 1977-1978.

Coastal Region

Some 43 percent of the total land in crops in the region, according to the survey, was used for production of tree crops. Crop suitability ratings indicate a high potential for most of these crops. Considering the relative levels of returns from olives, composing 38 percent of the total cropland, additional land could be planted to this crop. With only three percent of the total cropland planted to lemons, this profitable crop could also be expanded, as could figs, which occupied less than one percent of the total cropland planted.

About 20 percent of the total land in crops in the region, as reported in the survey, was used to produce vegetable crops. High crop suitability ratings, rainfed and irrigated for vegetable crops, together with relatively high returns for dry onions, tomatoes, cucumbers, and to some extent eggplants, indicate a potential crop adjustment toward increasing the land area of the region planted to these crops.

Although local wheat and barley comprised 26 percent of the total cropland planted, returns were so low in relation to returns from vegetables and fruit that emphasis would be better placed on producing the latter groups of crops.

Mountain Region

According to survey results about 6 percent of all the region's land in crops was planted to tobacco. Returns per dunom were high and exceeded returns for most other crops. Increases in hectares planted would be limited, however, by the need to adopt erosion control practices, and the nature of governmental licensing and pricing programs.

Over 45 percent of the cropland planted in the region was in small grain. Limitations to continued cropping, considering erosion hazards, and the low returns from these crops, make further increases in area planted doubtful.

Tree crops, primarily olives, would be expected to remain in production, for returns are adequate. The land in tree crops amounted to over 36 percent of the total land in the region planted to all crops, according to survey results.

Sesame, comprising less than one percent of the total cropland planted, and chickpeas planted on about 8 percent of the Cropland planted, offered the highest returns next to tobacco. Crop suitability ratings are high enough for increasing hectarages, although erosion control measures are a necessity.

Vegetables, apparently grown at a subsistence level, comprised less than one percent of the total cropland planted according to survey results. High family labor costs and erosion control requirements would limit any sizeable expansion in land planted to these crops.

Lowlands Region

Production of small grains and chickpeas ranked satisfactorily in net earnings. These crops occupied about 45 percent of the total land in crops. With most of the land being suitable for rainfed or irrigated production of small grains, limits to increases in planted hectareage would rest with government allocations and announced prices.

Tree crops, primarily olives, accounted for a major part of the total land planted to crops in the Lowlands. Crop suitability ratings are high enough and returns sufficiently high for increases in hectareage planted. This would include lemons, which occupied only about one percent of the total cropland planted to crops in the region.

Although tobacco comprised less than one percent of the total cropland planted, according to survey results, returns were high enough to warrant consideration of increasing the hectareage devoted to this crop. Governmental programs would be the determining factor for this possible expansion.

Vegetables grown at the time of the survey amounted to over 10 percent of the total cropland planted to crops in the region. Crop suitability ratings are generally high enough and the returns sufficient to warrant expansion of hectarages of dry onions and watermelons, while potato production would require improved farming practices to reduce costs in order to justify expansion of plantings.

According to survey results almost 5 percent of the total cropland planted in the Lowlands consisted of irrigated sugar beets. Production of this crop, subject to government controls, would likely be profitable only if labor requirements could be reduced further or product prices increased.

Irrigated cotton occupied about 6 percent of the region's total cropland planted. Because of high family labor costs expansion of hectareage planted to this crop appears doubtful, despite adequate crop suitability ratings. Other restrictions placed on future expansion of cotton hectareage are crop allocations and pricing programs of the government.

Undulating Plains

Over 90 percent of the Undulating Plains Region's total cropland planted was planted to small grains according to survey results. Returns per hectare from these crops appeared satisfactory and ranked below only some of the minor crops. Returns from local and Mexican Wheat were about even, although the largest proportion of the land in small grains was planted to barley. Other than low rainfall over sizeable proportions of the region which reduce crop suitabilities, government controls relative to hectarages planted would have a restricting effect on increases in hectarages of small grains.

Although farm survey results indicated that less than one percent of the total cropland in the Undulating Plains was planted to irrigated cotton, returns were lower for this crop than any other. While crops suitabilities are adequate for irrigated cotton, expansion of hectarages would be subject to governmental decisions.

Vegetables such as cucumbers, irrigated potatoes, and watermelons offered the next highest level of returns, although in the survey only 3 percent of the total hectareage of crops planted were vegetables. Crop suitability ratings are sufficiently high, and increases in area planted to these crops could be expected. However, rainfed production would need to be in the higher rainfall areas of the region.

Tree crops compose only about 5 percent of the region's total hectares planted to crops. Despite relatively high returns from olives, there is little reason to expect increases in hectares planted.

Euphrates and Tributaries Region

Well over half the cropland planted in the Euphrates and Tributaries Region was planted to small grains, primarily irrigated, according to survey results. With returns levels that existed and the suitability of the land for production of these crops, especially for Mexican Wheat, expansion in hectarages would be expected. Expansion, however, would be subject to limitations of government programs, adequacy of irrigation water, and gypsiferous soil conditions in some areas.

Irrigated cotton, according to survey results, was planted on about 38 percent of the total land planted to all crops in this region. Returns were highest for this crop but increases in hectarages are also limited by government control programs, availability of irrigation water, and gypsiferous soil conditions in some locations.

Tomatoes, occyping almost 3 percent of the planted cropland and sesame another 2 percent, both irrigated, ranked next in profitability. The same physical limitations occur with these crops as with cotton and small grains except for the absence of governmental controls. Therefore, expansion of hectarages planted to these crops could be expected.

Sugar beets, profitable in the region only if family labor costs are ignored, were planted on almost 4 percent of the total cropland planted. Other than government programs, the high labor costs would limit increases in planting of this crops.

Northeast Region

The Northeast had over 92 percent of its total land in crops planted to small grain. Returns per dunom for local and Mexican wheat, and barley ranked high, although further expansion to include additional hectarages would be limited by the nature of governmental programs affecting these crops generally, and low rainfall in the southern segment of the region.

Rainfed lentils planted on about two percent of the total cropped area in the region, ranked below small grains in returns. Cotton, under irrigation, produced higher returns per dunom than any crop in the region. Increases in cropland planted to cotton would depend upon governmental regulations and the adequacy of irrigation water. According to survey results cotton occupied 5 percent of the region's total land in crops.

Southwest Region

Over 62 percent of the land in crops in the Southwest was planted to small grains, and about 10 percent to lentils and chickpeas. Produced primarily under rainfed conditions, returns per dunom from these crops were negative and the last in rank of returns among the crops for which data were obtained. Little reason exists for expanding the hectarage planted to small grains in the region, unless family labor is reconciled to very low returns for its labor. In any case, low rainfall becomes a limiting factor in some areas, and crop production decisions by government officials must also be considered relative to expanding hectarages.

Tree and vine crops occupied over 20 percent of the total land in crops. Rainfed grapes and figs, irrigated apples and apricots, and olives were the crops for which data were obtained. Return levels, exceeded only by cotton and vegetables, and adequate crop suitability ratings indicate a potential for the allocation of additional land in the region to production of tree and vine crops.

Irrigated hectarages of cotton and vegetables, including tomatoes and potatoes, would be expected to increase within the restrictions of adequate irrigation water supplies. However, cotton comes under governmental production controls, which would affect any increases in planted areas.

Steppe Region

Cropland of the Steppe Region is located in small segments bordering the Euphrates and Tributaries and Undulating Plains regions in the northwest, and bordering the Undulating Plains to the Southwest. Over 92 percent of

the land in crops was planted to barley, according to survey results. Almost two percent as planted to local and Mexican Wheat. Most all of these small grains were produced under rainfed conditions. Barley returns were negative, indicating little potential for crop hectarage of expansion. Wheat returns appeared adequate, especially for Mexican Wheat and, within the confines of limited rainfall and government crop restrictions, could result in some potential for expansion of hectarages planted.

Grapes, for the most part rainfed, offer some potential for expanding hectarage as a result of higher return levels. Rainfall would be limiting over most of the regions and increases much above the survey results of one percent of total land in crops appear doubtful.

Irrigated cotton and vegetable crops have considerable potential for production in most areas of the Steppe. Adequate water supplies are the limiting factor other than government programs for cotton. All together, these crops accounted for only about 3 percent of the total land in crops. Sugar beets had high costs of production and were less profitable in the region than most other crops.

All Regions

Potentials for adjusting relative proportion of land in various crops consistent with returns reported in the survey, and within the confines of crop suitabilities together with programs for the government controlled crops, include:

Increasing rainfed small grain hectarage in the Northeast and Undulating Plains, while holding hectarage at current levels in the Coastal, Mountain, and Southwest regions.

Increasing irrigated small grain hectarages in the Lowlands and the Euphrates and Tributaries regions if irrigation water can be made available either through more efficient use and reduction of waste of existing supplies or through developing new sources.

Increasing lentil hectarages in the Undulating Plains and Northeast, and chickpea hectarages in the Lowlands and the Southwest regions.

Increasing irrigated cotton hectarage in the Euphrates and Tributaries and Northeast regions, and increasing hectarages in the Lowlands only as cost reducing production practices are applied.

Increasing irrigated sugar beet hectarages in the Lowlands and Euphrates and Tributaries regions, providing additional cost reducing production practices are adopted.

Increasing hectarages of tobacco in the Mountain Region only as indicated by crop and soil suitabilities.

Maintaining the extent of irrigated peanut hectarages in the Coastal Region while developing further the potentials that exist in the Lowlands, including the adoption of cost reducing production practices.

Increasing the hectarage of irrigated dry onions in the Coastal and Lowlands regions and if irrigation water is sufficient, in the Steppe.

Increasing irrigated and rainfed cucumber hectarages in the Coastal Region.

Increasing rainfed and irrigated tomato hectarage in the Coastal Region, and irrigated hectarages in the Euphrates and Tributaries Region and, to the extent irrigation water is available, also in the Southwest.

Increasing irrigated potato hectarages to the extent irrigation water is available in the Undulating Plains and the Southwest. Maintaining current hectarages of irrigated potatoes in the Lowlands and not increasing hectarages until cost reducing production practices are applied.

Maintaining current hectarages of irrigated eggplants in the Coastal and Mountain regions and not increasing hectarages until cost reducing production practices are applied.

Increasing hectarages of rainfed watermelons in the Lowlands and Undulating Plains regions.

Increasing hectarages of rainfed olives in the Mountains Region and irrigated and rainfed olives in the Lowlands and Southwest regions.

Increasing hectarages planted to rainfed grapes in the Southwest, the higher rainfall areas of the Steppe, and the Mountain Region.

Increasing hectarages of rainfed figs in the Southwest and Mountain regions, and to some extent in the Coastal Region.

Increasing irrigated apples and apricot hectarage in the Southwest, and rainfed hectarages in the Mountain and, to the extent irrigation water is available, also in the Steppe.

Increasing rainfed lemon hectarage in the Coastal Region and irrigated lemon hectarages in the Lowlands.

Increasing irrigated sesame hectarages in the Euphrates and Tributaries Region and, to the extent soils and crop potentials are suitable, increasing rainfed and irrigated hectarages of sesame in the Mountain Region.

Increasing hectarage of rainfed and irrigated forage crops in all regions where crop suitabilities and irrigation water supplies are sufficient. While little costs and returns information were collected on these crops, indications are that forage prices may be quite competitive with prices of other crops, reflecting the shortage of forage that exists for livestock production. Irrigated areas such as the Lowlands and the Euphrates and Tributaries regions would seem to be locations for planting forage crops such as alfalfa and other legumes, and forage sorghums. Rain-fed production of legume forage would have potentials in the higher rainfall areas of the Northeast, Undulating Plains and Southwest, where these forage crops could be incorporated into rotations with cereal crops in place of fallow. The extent to which forage crop production expansion is feasible would depend on the adoption of improved mechanized harvesting and transportation methods.

D. Crop Yields and Production Practices

An important part of the farm survey was the acquisition of production practices, inputs and yields for the major crops grown in Syria. The method used in this analysis was first to separate at the RPU level the data obtained from each farm holder concerning each crop into irrigated and rainfed production. Crop yields for each crop were then arrayed from the highest to lowest, making a list for each RPU for irrigated and rainfed yields. These lists were then divided into approximately three equal-sized groups based on the high, medium and low crop yield recorded. Data were recorded from survey results for each individual farm holder concerning cultivation size (parcel or field size for each crop), product yield, crop seeding rate, fertilizer and pesticide use, and crop rotation system. Averages for each RPU were then calculated. The resulting data by RPU and crop were then grouped into the type of farming regions and averages obtained by region.

The number of observations for each crop on which costs and returns information were obtained in the survey were sufficient to include only some of the major crops. Therefore, results are reported by region on only those crops with a sufficient number of observations for reliable comparison.

Within each region, variations in practices in the production of each crop was generally limited. Much of the variation in yields of any one crop in any region apparently reflects differences among farmers in their farming abilities or among fields in an area in productivity. In the summary that follows, only those variables that appeared to be of significance in affecting yields of one or more crops in several regions are identified and results reported. Other variables, such as amounts of hand labor and farm size, did not vary in any consistent fashion with yields.

Rainfed Crops

Local Wheat

Field size of rainfed local wheat tended to be smaller for the high yield group in all regions except the Euphrates and Tributaries Region and the Northeast, (Tables III-21 through III-28). Crop seeding rates, although low in regions with less rainfall, were generally heavier for the high yield groups in each region than for the other yield groups. The only exception was the Lowlands where the low yield group used the heaviest seeding rate.

The proportion of producers applying nitrogen fertilizer was highest in most regions among the high yield group, although average rates of application were not necessarily greater for this group. No definite pattern existed in phosphorous applications, although the proportion applying this fertilizer was somewhat higher among high yield groups in the Mountain, Lowlands and Undulating Plains. However, only in the Coast and Lowlands did a significant proportion of products use phosphorous. The only discernable proportions of producers using potassium fertilizer were those in the Coast and Lowlands, and application rates were low.

Insectides to any extent were used on rainfed local wheat in the Lowlands, while herbicides were used in the Mountain, Lowlands, and Undulating Plains. Only in the Mountain Region did proportions of producers using herbicides, and the application rates, seem to have a bearing on yield levels.

Crop rotation differences hardly seem to bear out any real difference in yields of rainfed local wheat. Fallow appears in rotations in the drier regions, with only a suggestion in the Euphrates and Tributaries Region that fallow-cereal-fallow was associated with the high yield group, while straight cereal was associated with the low yield group. A legume in the rotation was associated with the high yield group in the Southwest.

Mexican Wheat

No relationship existed between field size and yield group among the three regions producing rainfed Mexican Wheat (Tables III-21 through III-28). Seeding rates were slightly heavier for the high yield groups in the Undulating Plains and Northeast. Application rates of fertilizers were heavier for the high yield group in the Undulating Plains, while application rates had little relationship to yield levels. No fertilizers were used on Mexican Wheat in the Northeast. Pesticides were used only in the Lowlands and seemed to bear no relationship to yield levels. Rotations appeared to have no particular effect on yield levels among the three regions.

Barley

Rainfed barley producers interviewed during the farm survey in the high yield group generally tended to farm the smallest fields, except for those in the Euphrates and Tributaries Region (Tables III-21 through III-28).

Seeding rates were somewhat heavier among high yield groups except in the Lowlands. Fertilizer use on rainfed barley occurred only in the Mountain, Lowlands, and Undulating Plains. The proportion of producers applying fertilizers generally were higher among the high yield groups, while no particular relationship occurred between yields and fertilizer application rates. The presence of melons in the crop rotations may have had a negative effect on barley yields.

Lentils

Among the four regions producing rainfed lentils, no apparent relationship appeared consistent between yield levels and field size, (Tables III-21 through III-28). Seeding rates were some heavier for high yield groups in the Lowlands and Southwest. The proportions of producers applying fertilizer were larger for high yield groups only in the Lowlands for phosphorous. While insecticides were applied in all except the Southwest, herbicides were also applied by a small proportion of producers in the Lowlands. No relationship appears obvious between pesticides use and yields. Crop rotation influences on lentil yields are not apparent.

Chickpeas

Only heavier seeding rates appeared to be related to higher yields of rainfed chickpeas in the Southwest, (Tables III-21 through III-28). Farm survey observations on chickpea production in other regions were insufficient for yield group comparisons.

Tobacco

Tobacco produced under rainfed conditions, occurred for the most part in the Mountain Region (Tables III-21 through III-28). Here, producers with smaller fields had the higher yields. The high yield group also had larger proportions of producers reporting fertilizer and pesticides use and heavier rates of applications than for the lower yield groups.

Irrigated Crops

Local Wheat

Field size bore no particular relationship to yields of irrigated local wheat among regions, except that producers who planted smaller fields were those in the high yield group in the Euphrates and Tributaries Region, the Northeast, and the Steppe (Tables III-21 through III-28). Seeding rates appeared somewhat lower among the low yield groups in all regions except for yield groups in the Lowlands.

The proportions of producers applying nitrogen fertilizer were largest for high yield groups in the Lowlands, Undulating Plains, Southwest and Steppe regions. Application rates for those using nitrogen were heavier for high yield groups in the Euphrates and Tributaries Region, Northeast, and Steppe. The proportions applying phosphorous fertilizer were largest in the high yield groups only in the Northeast, Southwest and Steppe regions, while application rates were heaviest for high yield groups only in the

Euphrates and Tributaries Region. Proportions of producers using potassium fertilizer were larger for high yield groups in the Undulating Plains and the Steppe, while application rates were heavier among the high yield groups only in the Lowlands. Pesticides were used on irrigated local wheat only in the Lowlands and the Undulating Plains, and the use bore no apparent relationship to yields.

Crop rotation systems appeared to have no particular influence on yields, except that the appearance of fallow in the rotations in the Southwest and Steppe could indicate insufficient water supplies for continuous cropping.

Mexican Wheat

Few production practices appear to be associated with yield differences of irrigated Mexican Wheat according to the farm survey (Tables III-21 through III-28). However, field sizes were somewhat smaller among the high yield group of producers in the Euphrates and Tributaries Region and the Northeast.

Seeding rates were heavier for high yield groups in the Lowlands and Northeast. The proportions of producers applying nitrogen fertilizer was larger for the high yield group only in the Lowlands, while application rates were heavier for this group only in the Euphrates and Tributaries Region. The proportions of producers applying phosphorous fertilizer was greater for the high yield group in the Northeast, while few differences among yield groups and application rates were evident. Potassium fertilizer use appeared to be related to yield differences only in the Lowlands. Pesticides were used on irrigated Mexican Wheat only in the Lowlands, the proportions of operators applying pesticides and the application rates apparently having no apparent relationship to yield differences.

Crop rotations apparently bore no particular relationship to yield differences.

Barley

For irrigated barley, producers in high yield groups farmed smaller fields in the Euphrates and Tributaries Region and the Steppe, (Tables III-21 through III-28). Also seeding rates were heavier for high yield groups in these regions. Fertilizer use among the high and medium yield groups was more widespread and heavier than for the low yield groups in the three regions for which data were obtained. Pesticide use was negligible in all except the Undulating Plains, where only a portion of the medium yield group used herbicides.

Fallow in the crop rotation of the lower two yield groups in the Undulating Plains and Steppe regions seem to indicate irrigation water supply difficulties.

Cotton

Management practices and yield data for irrigated cotton were collected from producers in five regions, (Tables III-21 through III-28). Sizes of field farmed were largest for high yield groups in the Undulating Plains, Euphrates and Tributaries, and Steppe regions.

No apparent relationship seemed to exist between seeding rate and yield differences. The proportions of producers applying nitrogen fertilizer were largest among high yield groups in the Lowlands and the Steppe, while application rates were heaviest for this group in the Lowlands, Undulating Plains, and Euphrates and Tributaries regions. The proportions of producers applying phosphorous were larger for high yields in all five regions except the Steppe. Application rates were heavier for high yield groups only in the Euphrates and Tributaries Region. The proportions of producers using potassium fertilizer were largest for high yields in the Lowlands, Undulating Plains, and the Steppe.

Largest proportions of producers in high yield groups applied insecticides on their irrigated cotton the in the Lowlands, Undulating Plains, and Euphrates and Tributaries regions than did other yield groups. Application rate differences among the groups appeared not to be related to yield differences. The largest proportions of yield groups applying herbicides were among high yield groups in the Lowlands and the Euphrates and Tributaries regions, while application rates were heaviest among the high and medium yield groups in the Euphrates and Tributaries and Northeast regions.

No difference appear to exist between crop rotations and yield differences.

Table III-21. Yield Classes and Associated Production Practices By Crop, Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.	Dominant Rotations (Years Ago) 3/								
				N	P	K		Insect. Herb.	1	2	3	1	2	3		
<u>Rainfed:</u>																
Local Wheat																
High	20	200	25	3(100)						C	V	P				
Med.	30	150	15							V	C	V				
Low	78	100	11	2(100)			1 (33)	1 (33)		V	V	C				
<u>Irrigated:</u>																
Peanut																
High	4	162	8	8(100)			2 (40)	3 (40)	13 (20)		C	P	C	M	V	
Mid.	10	128	8	6(100)			2 (33)	1 (33)	4 (33)		C	V	P	V	C	
Low	9	105	5	6(100)			2 (33)	1 (33)	1 (33)		C	V	V	C	P	

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- 1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first column; subdominant rotations in second columns.
(C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables,
TB = Tobacco, O = Other, F = Fallow, P - Peanuts

Table III-22. Yield Classes and Associated Production Practices By Crop, Mountain Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept)		K	Insect. Herb.	Dominant Rotations (Years Ago) 3/					
				N	P			1	2	3	1	2	3
Rainfed:													
Local Wheat													
High	14	122	17	4 (87)			3 (20)	TB	C	TB			
Med.	12	84	15	6 (79)	2 (6)	2 (3)	2 (6)	TB	C	TB			
Low	16	60	14	4 (88)	2 (2)	7 (4)	1 (2)	TB	C	TB			
Barley													
High	8	93	16	6 (60)	2 (20)	4 (60)		CT	C	F	TB	C	TB
Med.	19	69	12	3 (100)				L	M	C	F	C	F
Low	19	39	10	3 (75)				F	C	F	C	L	C
Lentils													
High	8	73	13	3 (11)	4 (22)		4 (11)	C	F	L	C	V	C
Med.	11	51	23	2 (22)			2 (44)	C	L	F	F	C	F
Low	6	37	12	4 (17)	1 (17)		4 (34)	C	F	L	C	L	C
Tobacco													
High	4	94	--	15 (87)			9 (87)	C	TB	C			
Med.	5	53		6 (80)			4 (80)	C	TB	C			
Low	7	34		10 (76)			7 (76)	C	TB	C			

1/ Grouped according to one-third of the observations in each yield class (high, medium, low).

2/ Percent of all farms reporting use in parentheses.

3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns.
(C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables,
TB = Tobacco, O = Other, F = Fallow).

Table III-23. Yield Classes and Associated Production Practices By Crop, Lowlands
Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept)			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect. Herb.	1	2	3	1	2	3	
Rainfed:														
Local Wheat														
High	32	192	15	5(71)	2(50)	1(28)	8(10)	1(14)	M	C	C	M	L	C
Med.	24	103	16	19(58)	2(50)	1(17)	2(17)	2(50)	M	L	C	M	L	M
Low	40	57	22	5(70)	2(30)	1(10)	6(50)	2(30)	M	C	M	M	L	C
Mex. Wheat														
High	16	147	11	2(67)	0	0	0	0	CT	C	CT			
Med.	140	128	13	6(67)	2(67)	2(33)	0	1(67)	CT	C	CT	L	C	CT
Low	16	96	9	5(100)	1(25)	8(25)	1(25)	0	M	C	M	CT	C	CT
Barley														
High	19	134	12	4(73)	2(64)	1(9)	0	0	F	C	C	F	M	C
Med.	28	98	22	4(78)	2(33)	0	0	2(11)	M	C	M	M	C	C
Low	21	66	15	5(44)	2(22)	4(33)	0	0	L	C	C	M	C	M
Lentils														
High	12	113	15	4(44)	2(44)	13(22)	5(33)	5(11)	C	L	C	C	M	L
Med.	22	67	11	3(60)	2(20)	1(30)	5(10)	0	C	C	L	C	C	F
Low	36	40	11	4(25)	3(38)	1(25)	3(25)	0	C	M	L			

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(Continued)

Table III-23. (Continued)

Yield Classes and Associated Production Practices By Crop, Lowlands
Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept)			Pest (SL/dun. 2/ and Pct. Rept.			Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect. Herb.	1	2	3	1	2	3		
Irrigated:															
Local Wheat															
High	11	344	16	5(100)	0	6(17)	0	1(17)	M	U	M	L	C		
Med.	23	214	16	11(100)	2(20)	1(20)	0	1(40)	CT	SB	CT	C	SB		
Low	10	204	16	7(80)	2(20)	0	5(20)	0	CT	C	SB	C	CT		
Mex. Wheat															
High	8	181	21	5(100)	2(25)	3(38)	0	2(38)	CT	C	CT	C	C		
Med.	8	117	19	6(100)	1(11)	1(11)	1(33)	4(67)	SB	C	SB	C	CT		
Low	7	54	17	14(88)	1(38)	0	2(12)	2(38)	CT	C	CT	C	C		
Cotton															
High	16	271	12	10(83)	4(75)	9(67)	4(58)	C	SB	CT	C	CT	C		
Med.	13	183	13	9(67)	3(11)	12(11)	8(33)	6(44)	CT	CT	CT	CT	C		
Low	17	94	10	9(78)	3(67)	4(56)	6(33)	0	C	CT	C	CT	SB		
Sugar Beets															
High	6	3791	2	7(100)	5(57)	14(100)	8(71)	0	SB	C	SB	SB	T		
Med.	11	2661	4	12(88)	5(62)	15(75)	4(100)	4(12)	CT	CT	SB	SB	SB		
Low	11	1302	2	5(71)	3(71)	3(71)	7(86)	2(14)	SB	SB	SB	SB	SB		

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1/ Grouped according to one-third of the observations in each yield class (high, medium, low).

2/ Percent of all farms reporting use in parentheses.

3/ Years preceding current crop. Dominant rotation in first columns; subdominant rotations in second columns.

(C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow).

Table III-24. Yield Classes and Associated Production Practices By Crop, Undulating Plains
Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun.		Pest (SL/dun.	2/ and Pct. Rept.	Insect. Herb.	Dominant Rotations (Years Ago)					
				N	P				K	1	2	3	1	2
Rainfed:														
Local Wheat														
High	16	99	16	4(30)	3(7)	4(12)	3(2)	F	C	F	F	C	C	C
Med.	15	53	14	2(33)	7(2)	3(2)	2(2)	F	C	F	F	C	C	C
Low	55	37	12	2(22)	3(2)		2(6)	F	C	F	F	F	C	C
Mex. Wheat														
High	20	144	13	7(50)	5(50)			F	C	F				
Med.	32	122	10	1(50)	3(50)			F	C	F				
Low	30	43	10					F	C	F				
Barley														
High	68	111	14	4(19)	1(4)	4(7)	3(1)	F	C	F				
Med.	46	72	11	4(21)	6(3)		3(2)	F	C	F				
Low	57	35	12		6(19)	6(2)	3(2)	F	C	F	C	F	F	F
Lentils														
High	26	119	16				1(25)	C	M	L	F	C	F	F
Med.	11	92	13	1(40)	1(40)			C	F	C	C	M	C	C
Low	18	51	16	4(17)	1(17)		2(33)	C	F	C				

(Continued)

Table III-24. (Continued) Yield Classes and Associated Production Practices By Crop, Undulating Plains
Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept)			Pest (SL/dun. 2/ and Pct. Rept.	Dominant Rotations (Years Ago) 3/								
				N	P	K		Insect. Herb.	I	2	3	1	2	3		
<u>Irrigated:</u>																
<u>Local Wheat</u>																
High	23	260	14	8(100)	4(33)	2(67)		CT	C	CT	C	C			V	
Med.	24	145	16	7(100)	6(40)	2(20)	1(20)	CT	C	CT	L	F			C	
Low	15	86	12	8(25)				C	C	C	F	C			F	
<u>Barley</u>																
High	91	412	13	3(67)	5(33)			C	V	C	C	C			C	
Med.	25	131	14	11(67)	4(33)	7(33)	2(33)	F	C	L	F	CT			L	
Low	10	103	10	6(67)				V	C	V	V	F			C	
<u>Cotton</u>																
High	115	300	14	13(50)		25(100)	3(50)	C	CT	C						
Med.	16	250	9	11(100)	5(83)	10(83)	2(33)	C	CT	C	C	F			CT	
Low	6	111	23	12(67)	2(67)	1(67)		C	CT	C	C	CT			M	

1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns.
(C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables,
TB = Tobacco, O = Other, F = Fallow).

Table III-25. Yield Classes and Associated Production Practices By Crop, Euphrates and Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun.)	Fert. Use (kg/dun. 2/ and Pct. Rept)		K	Pest (SL/dun. 2/ and Pct. Rept.)		Dominant Rotations (Years Ago) 3/					
				N	P		Insect.	Herb.	1	2	3	1	2	3
Rainfed:														
Local Wheat														
High	106	67	10	5(12)					F	C	F	C	C	C
Med.	38	40	10						F	C	F	C	C	C
Low	52	21	7						C	C	C	F	C	C
Barley														
High	192	90	11						F	C	F	C	C	C
Med.	39	48	10						C	C	C	C	F	C
Low	49	26	9						C	C	C	C	F	C
Irrigated:														
Local Wheat														
High	10	355	16	8(78)	8(44)	2(45)		CT	C	CT				
Med.	11	218	18	6(100)	5(73)			CT	C	CT				
Low	13	117	11	6(100)	5(44)			CT	C	CT	C	CT	CT	CT
Mexican Wheat														
High	8	305	8	13(50)	3(50)			CT	C	CT				
Med.	30	274	12	6(100)				CT	C	CT	CT	CT	CT	C
Low	14	205	15	8(100)	6(67)			CT	C	CT				

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(Continued)

Table III-25. (Continued)

Yield Classes and Associated Production Practices By Crop, Euphrates
Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept. 2/		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect. Herb.	1	2	3	1	2	3	
<u>Irrigated:</u>														
<u>Barley</u>														
High	4	320	20	10(50)					C	C	CT			
Med.	12	150	16						CT	C	CT	CT	C	C
Low	16	42	16						CT	C	CT	CT	C	C
<u>Cotton</u>														
High	40	377	13	9(91)	13(87)	2(9)	5(13)	10(44)	CT	CT	CT	CT	C	CT
Med.	33	302	11	8(95)	8(77)	2(4)	8(8)	10(36)	C	CT	C	C	C	CT
Low	31	178	12	6(92)	7(85)	2(29)		6(14)	C	CT	C			

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1/ Grouped according to one-third of the observations in each yield class (high, medium, low).

2/ Percent of all farms reporting use in parentheses.

3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns.
(C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables,
TB = Tobacco, O = Other, F = Fallow).

Table III-26 Yield Classes and Associated Production Practices By Crop, Northeast
Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and <u>1/</u> Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun.)	Fert. Use (kg/dun. 2/ and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/						
				N	P	K	Insect. Herb.	1	2	3	1	2	3		
<u>Rainfed:</u>															
<u>Local Wheat</u>															
High	75	108	12	3(9)	2(9)			F	C	F					
Med.	92	86	12	1(10)	2(10)			F	C	F					
Low	62	62	10	6(2)				F	C	F					
<u>Mex. Wheat</u>															
High	96	130	12					F	C	F					
Med.	90	94	12					F	C	F					
Low	48	48	11					C	C	F					
<u>Barley</u>															
High	52	109	11					F	C	F					
Med.	52	73	10					F	C	F	C	C	C	F	F
Low	93	41	10					F	C	F	C	C	C	F	F

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(Continued)

Table III-26. (Continued) Yield Classes and Associated Production Practices By Crop, Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept) 2/		K	Insect. Herb.	Dominant Rotations (Years Ago) 3/			
				N	P			1	2	3	
<u>Irrigated:</u>											
Local Wheat											
High	30	226	13	7(54)	6(54)		CT	C	CT		
Med.	37	166	13	6(90)	6(70)		CT	C	CT		
Low	54	106	12	4(40)	3(20)		CT	C	CT		
Mex. Wheat											
High	54	249	13	4(33)	6(50)		CT	C	CT		
Med.	62	218	13	13(100)	12(40)	20(20)	CT	C	CT		
Low	87	116	11	8(60)	6(40)		CT	C	CT		
Cotton											
High	30	339	13	6(93)	10(71)	3(21)	11(7)	10(14)	C	CT	
Med.	44	255	12	11(94)	13(19)	2(7)	14(12)	10(12)	C	CT	
Low	32	185	12	6(86)	7(86)		7(64)	C	CT	C	

1/ Grouped according to one-third of the observations in each yield class (high, Medium, Low).

2/ Percent of all farms reporting use in parentheses.

3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns.

(C = Cereals, L= Legumes, T= Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables,

TB = Tobacco, O = Other, F = Fallow).

Table III-27. Yield Classes and Associated Production Practices By Crop, Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and l/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun.)	Fert. Use (kg/dun. 2/ and Pct. Rept) 2/		Pest (SL/dun. 2/ and Pct. Rept.)		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect. Herb.	1	2	3	1	2	3
<u>Rainfed:</u>													
<u>Local Wheat</u>													
High	21	104	12				1(11)	F	L	F	F	C	F
Med.	32	58	10					F	C	F	F	L	C
Low	42	32	8		1(17)			F	C	F	F	F	C
<u>Barley</u>													
High	16	90	8					F	C	F			
Med.	14	52	7					F	C	F			
Low	25	28	6					F	C	F			
<u>Lentils</u>													
High	12	38	9					F	C	F	F	C	L
Med.	14	26	7					C	L	C	C	F	C
Low	10	25	6					C	F	L	F	C	L
<u>Chickpeas</u>													
High	41	105	9					F	C	L	C	L	C
Med.	34	61	7				2(33)	F	C	L	C	L	C
Low	21	28	7				2(30)	F	L	C	C	F	C

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(Continued)

Table III-27. (Continued) Yield Classes and Associated Production Practices By Crop, Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept. 2/		Dominant Rotations (Years Ago) 3/				
				N	P	K	Insect. Herb.	1	2	3	1	2	3
<u>Irrigated:</u>													
Local Wheat													
High	18	211	24	4(100)	6(75)	4(25)		F	C	F	CT	C	CT
Med.	11	147	21	8(25)	2(25)	1(25)		F	C	F			
Low	18	102	18	8(25)	8(25)	4(25)		F	C	F			

- 1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
 2/ Percent of all farms reporting use in parentheses.
 3/ Years preceding current crop. Dominant rotation in first columns; subdominant rotations in second columns.
 (C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables,
 TB = Tobacco, O = Other, F = Fallow).

Table III-28. Yield Classes and Associated Production Practices By Crop, Steppe
Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept)		K	Insect. Herb.	Pest (SL/dun. 2/ and Pct. Rept.			Dominant Rotations (Years Ago) 3/		
				N	P			1	2	3	1	2	3
Rainfed:													
Local Wheat													
High	20	89	11	4(15)	1(15)	1(3)		F	C	F	C	C	C
Med.	25	57	11	3(5)				F	C	F	C	C	C
Low	43	44	8	4(13)				F	C	F	C	C	C
Barley													
High	39	76	12					C	C	C	F	C	F
Med.	33	48	11					C	C	C	F	C	F
Low	61	26	8					C	C	C	F	C	F
Irrigated:													
Local Wheat													
High	8	302	19	8(88)	3(50)	2(25)		C	T	C	CT	C	CT
Med.	10	181	17	4(44)	4(22)	8(22)		C	C	C	CT	C	CT
Low	19	130	18	6(33)	7(33)	4(11)		C	C	C	C	C	F
Barley													
High	5	274	16	3(29)	3(29)	2(29)		C	C	C	C	C	F
Med.	14	140	14	13(14)				F	F	T	T	C	T
Low	44	50	11	2(29)	1(14)			C	C	F	F	F	C

(Continued)

Table III-28. (Continued) Yield Classes and Associated Production Practices By Crop, Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. 2/ and Pct. Rept)		Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect. Herb.	1	2	3	1	2	3
Cotton													
High	39	269	11	6(100)	3(100)	1(40)		CT	C	CT	C	C	C
Med.	14	216	10	9(67)	3(67)	1(33)		C	CT	C	C	F	C
Low	12	157	11	6(67)	6(67)	2(33)		C	CT	C	F	C	F

- 1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first columns; sub-dominant rotations in second columns.
(C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons
Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow).

Syria: Agricultural Sector Assessment

Volume 1: Summary Report

CHAPTER IV

AGRICULTURAL MARKETING

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CHAPTER IV

AGRICULTURAL MARKETING

Assessment of a marketing system must consider the goals and objectives of the society in which it operates. It also must recognize that most societies operate with some conflicting goals and philosophies about the economic and non-economic direction of marketing systems. The specific roles of the state and of private interests may change from time to time in the course of development, but marketing functions must be performed effectively if the society's goals are to be achieved. This assessment reviews Syrian agricultural marketing in light of the current state of development of the economy and makes judgments and recommendations based on principles of the disciplines involved, on experiences with systems in other countries, and on field work carried out in Syria. The roles of the public and private sectors vary substantially among specific industries as well as at various stages within industries in the SAR. These roles have been changing in recent years and changes are still being planned.

This chapter first reviews pricing policies and programs in relation to commodity production responses, and presents estimates of future demand for major food items in 1985 and 2000. The role and performance of the agricultural marketing system are then examined for both crops and livestock, as well as for major farm production inputs. The concluding section discusses a planning model that emphasizes the agricultural sector and its linkages with the rest of the Syrian economy. Detailed reports on all these aspects are contained in Volume 4, Agricultural Marketing Annex.

A. Price PolicyGoals

In order to assess agricultural price policies and programs, relevant goals were extracted from the Fourth Five-Year plan for Economic and Social Development, from a statement of the Ba'athist Party goals for agricultural development, and from a paper on agricultural prices and price policy by Hisham Ahkrass. Those goals which appear to be related directly to price policy can be summarized as follows:

1. To establish prices of agricultural products which will ensure stability for the productive farmer's income and direct agricultural production within the planned targets. Price stability is implied.
2. To mobilize rural manpower to fully utilize agricultural resources and develop the countryside in general. Reducing migration from rural to urban areas is implied.
3. To achieve self-sufficiency in the production of main foodstuffs and commodities and to endeavor to achieve increasing rates of self-sufficiency in other commodities.
4. To improve the citizens' food standards and, in particular, the availability of animal proteins and to increase production of fruit and vegetable crops at prices as free from inflation as possible.

5. To provide the requirements of domestic industry for agricultural raw materials for the production of the required quantities of manufactured goods.

6. To achieve a surplus for export in order to contribute to reducing the balance of trade deficit.

7. To achieve real increase in agricultural GNP of 8-10 percent per year.

8. To protect both producer and consumer against the domination of market middlemen reaping benefits unwarranted by their services.

9. To regulate the agricultural market through considerable public-directed production and marketing activities but not necessarily to monopolize all stages of commodity production and marketing.

The orientation of the Syrian agricultural pricing policy includes the following characteristics:

1. Setting farm prices for products marketed by public or cooperative institutions.

2. Insuring cost-plus farm prices and use of premium in accordance with attempts to influence production.

3. Maintaining the financial position of state marketing institutions insofar as possible.

4. Announcing prices before planting season.

5. Coordinating buying prices in all producing regions.

6. Establishing prices with regard to grade characteristics.

7. Considering the forces of supply and demand in fixing wholesale and retail prices for products marketed by the private sector. Most such products are for direct consumption such as fresh fruits and vegetables, meat, eggs, and dairy products.

8. Basing selling prices of agricultural inputs on cost-plus with only minimum profit or a subsidy to achieve low cost and stability.

9. Allowing two types of price systems to operate in Syria concurrently. (a) A system of fixed prices set irrespective of supply and demand for certain crops and inputs marketed by the State or the cooperatives. Cost of production, production goals for each crop and world prices are considered in fixing annual crop prices and subsidies. (b) A semi-free pricing system where internal market forces of supply and demand, degree of competition and increasing consumer incomes are considered in setting prices. Direct consumption items such as fresh fruits and vegetables, poultry, meat and dairy products are prices within this market oriented system.

The foregoing goals, objectives and brief discussions of price programs used by SARG make it abundantly clear that the State is responsible for the economic performance of agriculture, disregarding the undue influence of weather. The goals for SAR price policy seem generally

reasonable except that self-sufficiency in all or most agricultural items seem uneconomic. From a strictly economic standpoint, it would be useful to determine the product mix from the commodities with the highest comparative advantages for Syrian agriculture producing areas, given world market prices as guides to resource allocation in Syria. The economic costs of the goals should be understood vis-a-vis the "best" market opportunities for Syrian agricultural commodities at home and in world trade.

Appraisal

Agricultural production is difficult to manage within any economy due to the small scale of production, perishability, of many agricultural products and the effects of weather on yield. Marketing of agricultural products, particularly highly perishable items, is even more complex due to the coordination of assembly, processing, storage, and distribution activities required to provide food supplies evenly throughout the country during the year.

Evidence and experience from other countries tend to support the general proposition that while government price supports and hectarage programs can increase production and allocate major crops, government attempts at regulating agriculture from production through marketing have not been particularly successful and have frequently been wasteful.

The difficulty in effectively administering the production and marketing of several crop livestock products is increased because of substitutability among crops by producers and end products by consumers. Slight misjudgment in terms of price setting and production planning can result in surpluses or shortages of specific items and in the associated misallocation of resources. These shortages and surpluses are not always apparent due to price regulations being violated or to the illegal movement of commodities among Turkey, Jordan, Lebanon and Syria in response to differential prices among these states. In contrast, the control of a few major crops and some marketing activities to limit the excesses of the sector would seem to be the more fruitful route. Subsidization of inputs--fertilizers, credit, improved seeds, and other items - is a good program for increasing and reallocating production when used with price floors for major crops.

The effects of price policies and programs to implement such policies can be evaluated to some extent by the response of growers as indicated by changes in areas planted, yields and production. However, the usefulness of such measures may be limited since, in addition to prices, grower's response is affected by natural resource constraints and by programs established to accomplish other policy objectives.

Relatively nonperishable staple commodities such as cereals are considered the most amenable to influence by price. Between the periods 1967-69 and 1974-77, wheat hectareage increased 45 percent, yields 29 percent, production 87 percent and prices 68 percent. During the same periods, barley prices increased 127 percent but hectareage increased only 51 percent, yields fell 10 percent and production rose only 34 percent. Lentils experienced the greatest relative price increase, 147 percent, but hectareage increased only 15 percent, yield 7 percent and production 23 percent. Although all commodities within the cereals group showed a positive response to price, there was an inverse ratio between relative price increases and production increases. Weather and other government programs were probably elements in this diverse response. However, it might be noted that differences in the relative levels within which the established prices for the different grains were varied may also have been an element in the diverse response. Wheat prices, although experiencing the smallest proportional rise, moved from a level somewhat below world prices to a level significantly above. Barley prices, on the other hand, moved within levels below world prices.

Cotton production has been restricted in recent years by programs to substitute planting of other crops, particularly sugar beets, for cotton. However, expanded production has been supported by very effective research, extension and marketing programs, and an increase in price of 66 percent between the 1967-69 period and 1974-76. The net effect of these several elements has been a 27 percent reduction in hectareage but a 50 percent increase in yield and a 10 percent increase in total production. Even though prices to farmers are below world market levels and hectareage reduced through other governments programs, cotton production apparently is still profitable enough to encourage farmers to expand production by adopting yield improving technology developed and made available through the research-extension programs and using inputs made available through the marketing system.

Tobacco production, like cotton, apparently has continued to be profitable within the ranges of established prices. However, response to price increases has taken a different form. Although prices were increased by 84 percent from the 1967-69 to 1974-76 period and hectareage increased 65 percent, yields fell by 10 percent and production increased only 48 percent.

Sugar beet production provides a striking contrast with cotton. Established prices increased 81 percent from 1967-69 to 1974-76 and are among the highest in the world. However, hectareage increased only 7 percent and continues at a very low level. Yields increased only 3 percent and production only 12 percent. In spite of the maintenance of prices at very high levels and vigorous government programs to expand production, persistent problems of low labor productivity and high costs appear to have restrained farmers' response.

The demand for fruits and vegetables has increased more rapidly than that for other crops. Prices, set to reflect changing local demand and supply situations, have risen more rapidly than for other crops with increases ranging from 90 to 150 percent for the crops for which 10-year price series are available. Farmers have responded with increases in both hectarage and yields. The proportional increases in production have considerably exceeded the increases in price for all commodities in this group except watermelons.

Production of meat and other animal products has been variable and trends have been quite diverse. Poultry meat production increased by 154 percent between 1967-69 and 1974-74 and beef increased by 74 percent. However, production of mutton and lamb meat, making up almost two-thirds of the total meat supply, declined by about 15 percent. Production of all meat increased only 6 percent. Dairy products, after trending downward from 1969 to 1973, have increased by 70 percent since that time. Egg production has increased steadily since 1964 and has more than doubled. Prices of animal products generally have been allowed to move rather freely, being restrained only by government imports in periods of particularly short supply and establishment of ceiling prices in the dominant commercial market of Damascus. The government also has acted to increase production of animal products and therefore restrain price increases. These actions have included introduction of higher-producing breeds, importation of feed stuffs, establishment of feed mills and providing other services to assist producers. On the average, prices of animal products have risen more rapidly than cereal prices, reflecting a much greater increase in demand for animal products. Response of growers has been constrained by the decline in range feeds in the early seventies due primarily to weather and overgrazing that led to reduction in livestock numbers and by the continuing shortages of feed, particularly range and forage.

In summary, we can conclude that agriculture production and consumption habits in Syria have undergone major changes over time. To meet rising demand from increasing population and higher incomes, large increases in crop and animal supplies (production and imports) have been necessary. After a serious decline in total agricultural production during the second half of the 1960's through the early 1970's, crop production has increased substantially, particularly feed grains, fruits and vegetables. Wheat production has increased but the vagaries of weather result in large annual fluctuations. Cotton and sugar beet production have not increased significantly. In the cases of animal products, output of dairy products, eggs, poultry and beef have increased while output of sheep meat has declined.

Progress in achieving self-sufficiency has been lacking except for a few commodities such as potatoes, dairy products and eggs. Imports have continued to grow in weight and value, contributing to a balance of payments problem. Prices for foodstuffs have been increasing rapidly and

now outpace the general price indices at the retail and wholesale levels. Consumers have made changes in their diet: cereal consumption has remained relatively stable in spite of decreasing real prices, while fruit, vegetable, dairy and egg consumption (per capita) have increased despite increasing real prices.

Among the industrial crops, cotton was the leading earner of foreign exchange until 1974 when it was exceeded by petroleum exports. Cotton is still a major source of foreign earnings for Syria but its production has been discouraged by recent SARG policy.

It can be stated that SARG has officially stabilized prices for major crops and consumer items such as bread, rice, sugar and vegetable oil through setting prices and rationing. However, in the case of cereals it is not really known at what "price" a large volume of the wheat and barley are selling because the government has generally received far less than half the crop. It may be because producers prefer to keep the remainder of the crop for on-the-farm use or to sell it for higher prices elsewhere. It is difficult to determine what effect price has on wheat crop acquisition by SARG. A consistent 38-39 percent of the crop was acquired during 1974, 1975, and 1976 when prices reached the 477-541 SL per ton price levels. Of course, these were also larger wheat production years. The percent purchased dropped to 29 in 1977 when total production declined and price increased by 20 percent.

Lentils possibly provide an example of the government's breaking the farmer's reservation price level in 1975 and 1976. The government purchases ranged between 0.9 and 54.0 percent of the lentil crop during 1970-1974. However, when the price jumped by almost 80 percent between 1974 and 1975, the government got 79 and 98 percent of production in 1975 and 1976, respectively. This explains SARG's reducing the lentil price in 1977 and 1978. It appears that growers were willing to relinquish practically all of the lentil crop at the relatively high prices for 1975, 1976, and 1977.

An economic explanation of the high crop retention rates by producers may be that earlier they were getting higher prices or value-in-use elsewhere for wheat, lentils and barley. Then, as established prices rose significantly in recent years, growers have sold more to the government and kept less. Of course, there may be other than economic reasons for the producers withholding large quantities from the market.

Major crop prices have been set on a cost of production basis, largely disregarding world conditions, and have closely paralleled the Damascus Consumer Price Index (CPI) in a relative sense. Thus, to the extent the CPI represents prices paid by farmers, the major prices are

parity prices. However, farm level costs probably haven't risen as fast as the Damascus CPI so that the government-set prices are somewhat inflationary.

There is a question of whether present supported prices are aiding farmers on very small production units. Obviously, higher prices are preferred to lower prices but the hectarage may not be large enough to provide sufficient income to prevent farmers and their families from becoming discouraged and leaving for the city or a neighboring country. Also, the great variation in crop yields must affect farm incomes adversely particularly those of small farmers. Perhaps some type of crop insurance or direct payments to farmers could be used to supplement small-farm income.

Finally, the budgeted cost for price subsidies, which is probably considerably below actual subsidies, seems high relative to the value of total agricultural production. The value of agricultural production at current prices was 5898.6 million SL in 1976, averaging 4639.3 million SL during 1974-1976. Value of total plant production averaged over two-thirds of total agricultural production at 3342.3 million SL for 1974-76 and 4031.3 million SL in 1976. Thus, in 1976 the 600 million SL for price subsidies would be 10 percent of the total value of agricultural production and 15 percent of the total value of plant production. Since this 600 million SL is for known or specified subsidies and there are probably many hidden subsidies, the full extent of subsidies within the agricultural sector may be more extensive than realized.

Continuance or expanded application of current government price policy may lead to an increasingly inflationary situation. Consider the effect of all Syrian's buying bread from the state wheat/flour program in contrast with the current situation in which most wheat is retained for the farmer's discretionary use. Such expansion would greatly increase the cost of price subsidies for the wheat/flour subsector. Increased self-sufficiency in sugar will increase subsidy costs due to the high domestic versus world sugar prices. Further, if the drive for self-sufficiency in certain crops infringes on cotton hectarage, cotton production, exports and foreign exchange will be reduced.

In all, SARG's policies have stablized prices for major crops and basic food items such as bread, rice, sugar, and vegetable oils. Commodities in freer markets have experience significantly greater increases in production than have the controlled crops. Unfortunately these crops--vegetables, fruits, and animal products--have had faster-rising prices than the major crops. Of course, the increased production is probably associated with these attractive prices.

The major unanswered question concerns the costs of the State's production and market intervention programs. These costs include (a) direct price subsidies, (b) subsidized operating cost for State companies and, possibly, (c) the opportunity cost of using State funds for traditional public services such as schools, roads, hospitals, parks, and other community enhancing facilities and services which would improve the quality of life in rural areas, leaving most of the agricultural production and marketing activities to the private sector. This does not mean that the State should not attempt to direct and encourage production or influence efficient marketing. It is to suggest that careful scrutiny be paid to the total costs of current proposed programs, cost in terms of both direct monetary and indirect opportunity costs. Other means of subsidizing consumers' and producers' incomes may not result in as severe a misallocation of resources and yet increase total welfare.

B. Commodity Demand Projections

As the preceeding brief review of production responses indicates, there have been rather spectacular increases in overall agricultural production. However, with the rapidly rising population and expanded per capita incomes, the increase in demand has been even more spectacular, requiring a rapid increase in imports of food, feed and other agricultural products. In order to provide some indication of the job ahead for the agricultural sector, estimates of demand for major food items have been made for 1985 and 2000. These projections are based on recent projections of population growth and a range of projections in real per capita income and consumption expenditures. The higher expenditure projection (Alternative I, Table 1) was made by the State Planning Commission and indicates an increase in real per capita consumption expenditures from the 1975 base year to 1985 of about 63 percent and an increase from the base years to 2000 of about 143 percent. A more modest projection by FAO (Alternative II, Table 1) indicates an increase of only 29 percent from 1975 to 1985 and of 114 percent from 1975 to 2000. A projection of zero increase in income and expenditures is also used (Alternative III, Table 1) to provide a measure of the increase in demand that would be expected from population growth alone. Expenditure elasticities, used to take account of changes to be expected in consumer buying habits as real incomes change, are estimates developed by FAO for Syria, based on FAO's experience with food demand-expenditure relationships for countries throughout the world.

Population growth alone would increase the demand by 1985 for each of the major food categories by about 45 percent above the base year (Table 1). When projected increases in income are combined with the effects of increased population, the projected increases in expenditures vary markedly among commodity groups reflecting expected changes in consumption patterns as incomes increase. Least affected by changes in income would

Table 1. Total consumption of major food groups, base year and projected 1985 and 2000, by alternative expenditure levels, SAR

Food Group	Alternative Increases in Expenditure level	Base 1975	1985		2000	
		1000 MT	1000 MT	Percent of base	1000 MT	Percent of base
Cereals	I-High	1333.7	1917	143.7	2674	200.5
	II-Mod.	---	1979	148.4	2882	216.1
	III-None	---	1932	144.9	3063	229.7
Potatoes	I-High	103.0	171	166.0	299	290.3
	II-Mod.	---	161	156.3	290	281.5
	III-None	---	149	144.7	236	229.1
Sugar Products	I-High	195.6	346	176.9	639	326.7
	II-Mod.	---	321	164.1	612	312.9
	III-None	---	284	145.2	449	229.5
Pulses	I-High	181.1	297	164.0	497	274.4
Nuts	II-Mod.	---	271	149.6	474	261.7
Oilseeds	III-None	---	260	143.6	414	228.6
Vegetables	I-High	1478.8	2597	175.6	4557	308.2
	II-Mod.	---	2397	162.1	4432	299.7
	III-None	---	2143	144.9	3396	229.6
Fruits	I-High	1350.1	2366	175.2	4029	298.4
	II-Mod.	---	2199	162.8	3914	289.9
	III-None	---	1957	144.9	3100	229.6
Meats	I-High	108.4	246	226.9	513	473.2
	II-Mod.	---	201	185.4	457	421.6
	III-None	---	159	146.7	248	228.8
Eggs	I-High	32.7	85	259.9	185	565.7
	II-Mod.	---	64	195.7	158	483.2
	III-None	---	47	143.7	75	229.3
Whole Milk	I-High	198.6	428	215.5	862	434.0
	II-Mod.	---	361	181.8	803	404.3
	III-None	---	288	145.0	456	229.6
Cheese	I-High	31.2	67	214.7	146	467.9
	II-Mod.	---	55	176.3	132	423.1
	III-None	---	45	144.2	72	230.7
Fats and Oils	I-High	79.5	138	173.6	270	339.6
	II-Mod.	---	127	159.7	258	324.5
	III-None	---	115	144.6	183	230.2
Total	I-High	5108.6	8718	170.6	14,797	289.6
	II-Mod.	---	8186	160.2	14,527	284.4
	III-None	---	7404	144.9	11,734	229.7

be the consumption of cereals. With only a moderate increase in income, total consumption of cereals is projected to increase by 1985 by only 48 percent over the base year with a 45 percent increase being projected as a result of population changes only. The very small increase in per capita consumption associated with a moderate increase in income reflects the general tendency of consumers to spend a higher proportion of increase in income and food budget on other foods, particularly high protein foods, and reduce the proportion spent on cereals. In fact, with the higher projected increase in income, the actual per capita consumption of cereals would be expected to decline. By 2000, per capita consumption would be expected to decline with either moderate or higher income increases.

For other foods, progressively higher incomes would be accompanied by progressively higher per capita consumption and progressively greater increases in total consumption. The greatest increases in both per capita and total consumption would be for animal products - meat, eggs and dairy products. However, higher incomes would also increase consumption of sugar, fruits, vegetables and fats and oils quite substantially.

Expenditures for nonfood farm products such as cotton, wool and tobacco would likewise increase as a result of both income and population increases. Cotton, being the largest agriculture export item, is expected to continue available at levels far above domestic requirements but imports of other types of textile fibers or products are also expected to continue at relatively high levels in order to meet specialized demands. Tobacco and tobacco products also can be expected to continue as both export and import items as a result of a range of type and quality requirements.

In summary, the total quantity of foodstuffs is projected to increase by 1985 to a level 60 percent above the base year if only the moderate increase in incomes is realized or by 71 percent if the higher income level is attained. By the year 2000 the increase over the base is projected to reach 185 percent at the lower rate of income growth and 190 percent at the higher. In all instances growth in population will be the major force pushing up the demand for food, accounting for a 45 percent increase in 1985 and 130 percent in 2000.

Conclusions

1. SARG policy is clearly providing stable prices and markets for major crops for those producers who choose to deliver their crops. In the case of some major crops--wheat, barley, and lentils--participation has frequently been low. The general policy of higher farm prices and moderate consumer food prices may be resulting in increased subsidy costs and inflationary pressures as well as reduced foreign exchange earnings, all of which are contrary to other stated SARG policy.

2. Economic planning to the degree attempted by SARG clearly requires a large volume of data as well as careful analyses of these data. The team's impression was that considerable data may be available among the various ministries and general organizations but there appeared to be no central analytical staff to evaluate the data. We recommend that a modest sized staff of economic analysts be assembled in one location with the fulltime mission of evaluating current and proposed programs in terms of production, prices, consumption, trade, carryover stocks, program costs (including subsidies) and benefits, program participation by producers and consumers, and income levels and distribution. While evaluation of programs would be a major responsibility, the staff group might also propose and evaluate programs given alternative objectives. However, this staff should primarily be an objective analytical group rather than being advocates of any particular policy.

Specific tasks for the above staff should include: (a) estimating losses of sales due to smuggling associated with price differentials among Syria, Lebanon, Jordan and Turkey; (b) determining the amount of bread wasted due to the extremely low price (some fed livestock), and (c) determining costs of current agricultural production and marketing programs in terms of both direct subsidies and operating subsidies on a crop-by-crop basis.

3. Another major data project which would be very useful for planning purposes is a consistent set of commodity balance tables. These tables can be based on the UN's FAO balance table method which attempts to (a) determine annual supply and (b) partition supply among various uses, waste, and carryover stocks. Three sets of balance tables were found by the team, one each in Ministry of Agriculture and Agrarian Reform (MAAR), Ministry of Supply and Internal Trade (MSIT) and Central Bureau of Statistics (CBS). Each set was significantly different from the other two. A consistent set of balance tables will also be valuable for assessing average nutritional levels. This activity might be located within the MSIT because of their responsibility for projecting annual consumption needs and the existing staff expertise.

4. In addition to the above-mentioned balance tables, specific information from household surveys would be useful for determining detailed consumption patterns and income or consumption elasticities. Specific income elasticities for SAR should provide (a) greater insight into changing consumption patterns and (b) better demand projections. Household consumption surveys were conducted in 1961/62 and 1971/72, providing useful data. However, the next survey should determine rates of consumption for families with different income levels so that expenditures and income elasticities can be developed. At present, demand projections

for Syria incorporate FAO expenditure elasticities since no domestic elasticities were readily available for all of the desired commodities.

5. As indicated earlier, considerable data on agriculture were available among the various state agencies but a valuable contribution could be made by compiling and incorporating these data in the Annual Agricultural Statistical Abstract. Such a publication would contain all available price, production, utilization, trade, etc. data on agriculture rather than only the production and land use data in the recent 1976 agricultural abstract. Much of the agricultural-related data in the CBS annual Statistical Abstract should be included in the agricultural data in one publication and eliminate any gaps therein.

6. A major thesis of this assessment is that SARG may be too involved in both production and marketing, thereby tending to stifle efficiency and investment. Thus, we recommend the following operational items:

(a). Utilize price supports (rather than fixed prices) selectively to allocate production and support farmers' incomes. Price supports are beneficial proportionate to the farm size. Since most farmers have very little to sell, price supports would not appear to be as beneficial as income support. In any event, price supports will allow prices to rise more for those products in greatest demand or shortest supply. Of course, price floors must not be set so high that surpluses occur frequently. This "flexibility above the price support level" approach will aid on both production and consumption allocation.

(b). Commodity production should be relatively free to move within Syria's boundaries so as to determine the most efficient pattern of production.

(c). Concern about exploitive middlemen may be well founded but the decision that the State should dominate the agricultural marketing sector probably is not. Better ways of promoting competitive and efficient marketing could include modest State purchase and storage activities to keep prices reasonable and provision of adequate market information on prices and supplies for both producers and consumers. Newspapers would be useful information outlets.

7. The sugar program needs a thorough examination in terms of the costs of producing sugar domestically versus importing. Imported sugar frequently is cheaper than that produced in SAR. FAO projections to 1985 indicate plentiful world supplies and reasonable prices.

8. If SARG planners continue to pursue the marketing of vegetables and meat (in Damascus), the operational personnel need to be given greater authority to adjust prices in accordance with cost and demand factors.

In a sense, one could argue that government programs have created a degree of uncertainty which has prevented the capital investment necessary for increasing productivity. While price stability has been beneficial, the small units created through land reform cannot adopt much in the way of yield-increasing technology.

Poultry production units, which require some size in order to be efficient, have apparently been restrained by the threat of nationalization. Modern poultry operations have been much slower to develop than in Lebanon, for example. SARG needs to determine how important size of production unit is for increasing production efficiency and then encourage such scale of enterprise. These would presumably be modest sized units but not necessarily the extremely small ones currently dominating Syrian agriculture.

9. Cooperatives are currently used to alleviate the scale or size problem, i.e., cooperative marketing assembles volumes for more efficient handling from a larger number of small production units. How well is this working? The State has only been able to get 31 percent of the wheat crop (average 1967-1976) and is forced to import wheat to meet projected consumption needs. Imports of wheat and flour were greater than the total amount of wheat purchased by the State from SARG producers during the nine-year period 1967-1975 with only about 30 percent of the total production sold to the State.

C. Commodity Marketing System

Agricultural commodity marketing systems in the Syrian Arab Republic range all the way from a government monopoly for industrial crops like tobacco, cotton and sugar to private sector marketing of crops like olives and grapes. Most of the others are somewhere inbetween, with some indications that the government is increasing its role in marketing and may eventually dominate all commodities and functions.

The systems have commodities like wheat that are subsidized at the farm level with prices above the world market and also subsidized at the consumer level with flour and bread sold substantially below cost. On the other hand, there are commodities like cotton and tobacco from which the monopoly marketing extracts substantial tax or profits for the government.

As one might expect from the foregoing, it is difficult to generalize about the basic legal and economic framework shaping agricultural marketing and international trade in these products except to note that it appears to be national policy to control as many prices as possible and for the public sector to operate as much of the marketing system as possible. The private sector still operates practically all of the food retailing, although most of the new investment in facilities appears to be government

operations. Fifty-five government operated shopping centers are planned for the country. Some are already in operation. New government owned fruit and vegetable stores are being constructed and government owned supermarket include food departments. Government operations dominate processing, international trade, and for some commodities, the wholesale and distribution functions.

In seminar papers and discussions on the topic of Agricultural Issues, February 1977, in which Syrian officials participated, conflicting views were expressed on the desired role of the private versus the public sector. It appears that the value of the private sector is recognized, but there is a feeling that middlemen cannot be allowed to operate without controls that protect producers and consumers from exploitation. Some statements implied replacing middlemen with government companies.

There appear to be no organized credit system or program to facilitate loans to merchants, traders or distributors. There is an Agricultural Cooperative Bank (ACB) to finance farmers and a source of financing for housing, apartments and factories, but middlemen must arrange their financing in a more informal manner, either from owned funds, suppliers, or private individuals. There appears to be no standard practice of short-term inventory financing of merchants by commercial banks. Although one official insisted that loans are available to merchants from Syrian banks, merchants contacted said that bank loans were not generally used to finance inventory.

As one might expect from the previous description of the wide variation in legal and economic condition under which marketing firms operate, overall market performance varies from good to poor. Basic problems are low labor productivity, lack of flexibility in management, generally little new capital investment in the private sector, and limited supplies, variety and sizes of processed foods.

Comparisons with neighboring countries were not attempted, but the impression is that overall development and performance of the marketing system lags behind that of Jordan and Lebanon and that there are many opportunities for improvement. Most retail shops are very small with low volume, and the distribution system to them are the jobber-peddler type. Commodity marketing as opposed to finished product marketing often employs modern technology and modern systems. However, little attention has been paid to labor productivity and bulk handling has not been adopted in some of the obvious applications such as handling wheat and flour.

Functions of a Marketing System

The role of a marketing system is not as easily understood or described as in a production system. However, when it fails to operate due to wars, strikes or boycotts, its values can be better understood. For example, cotton at Aleppo has little value unless it can be moved to textile mills, transformed into clothes and made available to someone to purchase and wear. Likewise, bananas in Central America are of no value to Syrians unless they are transported and ripened; their value is even enhanced if they are available within a short walking distance of one's home. In both of these examples, more than half of the value to consumers was created by the marketing system. These marketing margins, to the extent they represent cost and reasonable profits, are legitimate charges for services rendered and cannot be avoided if the product is to be delivered at the proper time and place in the desired form.

To restate this marketing function in general terms, the role of marketing is to create time, form and space utility. In terms of agricultural commodities, the purpose of the marketing system is to utilize raw agricultural products in satisfying needs of consumers for quality, variety, and convenience in form at a time and place desired and for which they are willing to pay the necessary costs. In the United States, because of the long distances products are moved and because income levels permit people to demand packaging, convenience, and in some cases product, marketing costs for food average about 60 percent of the total retail costs. Average Syrian marketing costs were not available but they are certainly lower than in the U.S. because fewer marketing and processing services are performed and wage rates are lower.

Consumer demands for food are more or less regular; a food marketing system must have the flexibility to procure food where and when it is produced because agriculture production is annual, seasonal, cyclical and subject to great variability. Syria, with its erratic dry climate, must be organized for storage and to take advantage of trade to meet food needs. It should also recognize the lack of a large domestic market for some products and look to substantial trade with neighboring countries and world markets for specialized and low volume products if it wishes to achieve maximum levels of living. It must also look to international sales for some products in which it has a competitive advantage, as it has long done with cotton.

There are many ways to operate a marketing system but performance depends on the quality of management, facilities, transportation and communication. It also depends on the nature of the legal and economic environment which shapes the rules of operation, the feasibility of effective contracts and the degree to which it fosters investment.

Almost every country has some distinctive features in its marketing system because the system may be shaped in many alternative ways. Some of these are: (a) open competition, (b) price controls and/or margin controls, (c) subsidies and/or taxes, (d) government operation, (e) franchised monopoly, (f) cooperatives, (g) sector exposure to foreign competition with low import tariffs (perhaps a maximum of 15 percent) and no volume controls, and finally (h) a mixture of the above.

Current Marketing Policy

The goals of the current policy regarding the marketing of agricultural products may be specified as follows: (a) protection of both producer and consumer against the domination of individual intermediaries which may occur in an uncontrolled marketing system; (b) provision of adequate economic incentives to encourage production and the crop composition specified by the plan; (c) supplying the institutions of the public sector responsible for trade and industrialization with the needed quantity of agricultural goods according to the plan; (d) supplying food stuff to consumers at prices which are stable and free from inflation; (e) gradual substitution of cooperative marketing and production for individual control. This policy is a political goal as well as a means for improving production and marketing efficiency.

In order to achieve these goals, the SARG has implemented a number of marketing policies for agricultural products. (a) The role of the private trader in the marketing of crops has been lessened while at the same time reinforcing the public sector; (b) the production of crops to be used for essential foodstuffs, exports, and for industrial production is encouraged according to the plan. Specialized agencies have been set up for this purpose and now control several of the marketing stages, including industrial processing of such crops as wheat, barley, lentils, cotton, tobacco, sugarbeets and peanuts. The area planted to these crops amounts to 75 percent of the total irrigated acreage in the country and around 90 percent of the rainfed area. The State has also started to market basic inputs such as fertilizer, machinery, fuel and most of the insecticides and improved seeds. (c) The public sector plays a significant role in the marketing of essential foodstuffs such as meat, dairy products, vegetables and fruits. These activities in the past were mostly in the hands of the private sector. (d) A cooperative sector, represented by the Peasant's Union has been established, giving it more marketing responsibilities and involving more stages of the marketing process. This includes handling the products from the farmers' fields to the wholesaler and in some cases engaging in processing and/or delivery to the consumer or retail outlet. This depends on the products, the nature of the marketing channel, and the ability of the Peasant's Union to undertake such responsibility. (e) The private sector, represented

primarily by the small retailers, is allowed to market the remaining agricultural products, including mainly those intended for direct consumption.

Evaluation of Performance

Performance of a marketing system is evaluated in a market structure, market conducts, market performance framework. Market structures refers to the market situation with respect to competition or other rules of operation such as degrees of concentration, ease of entry, or economies to scale and it shapes market conduct. Market conduct relates to output and price policies. Market performance is evaluated in terms of the extent to which it serves the needs of producers and consumers and achieves society's goals, given the resource base.

Dimensions of performance are equity, progressiveness, efficiency, responsiveness to consumers' demands and the extent to which the industry contributes to full employment of the economy's resources. Precise measurement of these dimensions of performance is not possible in any country. But this is not necessary provided one is able to identify qualitatively areas of poor, average or good performance and to indicate areas for improvement. Performance of the marketing systems for the several major agricultural commodities ranges from very good to poor when evaluated on the basis of the above criteria.

Performance of the fresh fruit and vegetable marketing system is judged to be good in spite of lagging investments that have resulted in continued use of old, obsolete facilities, low labor productivity and substantial waste of product. The private sector reportedly has virtually curtailed investment because of uncertainty as to its future role. Investments by the public sector have been increased but still fall short of needs. Facilities that are being built do not provide for use of modern handling equipment that would increase labor productivity and reduce waste. However, even with these constraints, the system has provided growers ready access to markets at competitive prices and has responded effectively to increased consumer demand. It has provided consumers an abundant supply and wide variety of good quality produce at convenient locations. Shortages in domestic production have been met with imports as needed. Entry has been relatively free and enough individuals or private firms have entered the market to assure a high level of competition and to restrain development of monopolistic profits. Marketing costs, except for those affected by inadequate facilities, are low compared with those of other countries. Marketing margins are also low and are in line with existing costs.

Performance of the food processing system has been relatively poor. It has not provided a very significant outlet for growers nor responded well to the increased quantity and variety of processed foods demanded by consumers. A major portion of the processed foods consumed in Syria are grown and processed abroad. Public investments have been increased substantially but private investments have increased very little and total investments have fallen short of the requirements to meet the expanded demand. Modern, more efficient handling and storage procedures can not be followed in many existing facilities. The facilities that are available are not being fully utilized, due in some instances to shortages of raw materials, the production of which is beyond control of the system. However, in most instances the system has the opportunity to influence, if not directly control, the supply by contracting with growers directly or through cooperatives. Plant operations generally appear to be well managed but labor costs are high, productivity is low and turnover is large. Managers report that they do not have sufficient flexibility in carrying out their management function to correct the inefficient use of labor or make other adjustments to lower costs. Both motivation and opportunity to do a better job appear to be lacking. There clearly are good opportunities to expand the food processing industry but investment would have to be increased, additional managers and supervisors would have to be given technical training, and more effective measures of efficiency and procedures for attaining efficiency would have to be adopted if the opportunities are to be realized.

The marketing system for cereals is composed of several government controlled general organizations and related companies. It is subject to external constraints that create various operating problems and complicate its response to changing demands. Operating within these constraints, the performance of the system appears to have been relatively good. Production, responding largely to forces beyond the control of the marketing system, has increased markedly over the past decade. It is still subject to extreme weather - induced fluctuations and generally falls considerably short of demands for both food and feed grains. Fluctuations in the volumes of domestically produced grains handled by the marketing system and in the offsetting imports required have been even greater than the fluctuations in production. Yet the marketing system has been able to adjust effectively, providing farmers in all locations outlets at established prices for all the grain they wish to sell even in the best crops years, and providing consumers adequate supplies at established prices even in the poorest crop years. The prices established are not free competitive prices but are in line with accomplishment of government policy objectives. Since spreads between producer and consumer prices are very low or, in the case of food grains, negative, they must be supplemented with heavy government subsidies. Thus, measures of marketing margins do not provide meaningful indicators of marketing efficiency. Likewise, marketing costs are not very useful since most functions are performed by

organizations operating as monopolies so that there are no alternative cost criteria against which operations can be evaluated. Many modern facilities have been constructed for receiving, storing, transporting and processing grain. However, many facilities, particularly for local receiving and storage, are old and not adaptable to modern lower-cost handling procedures. Additional storage facilities are needed and this need will become critical if plans for creating additional reserves are realized. Such facilities should be designed to permit bulk handling if the benefits of existing facilities equipped to handle grain in this manner are to be realized. When construction now underway is completed, flour milling facilities will be adequate for the present and near future. Attainment of government goals for expansion of the distribution of better quality bread will require major expansion of baking facilities. A number of modern feed milling facilities have been constructed but several of these are operating well below requirements for mixed feeds and will have to be about doubled to meet projected needs in 1985. Full utilization of existing and planned new facilities will require a major increase in supplies of raw material, either great expansion of domestic production or increased imports.

The performance of the marketing system for cotton fibers, evaluated against any generally accepted set of criteria, is very good. The government-sponsored Cotton Bureau and Cotton Marketing Organization are responsible for all supporting research, quality control and marketing functions. They have created an efficient system that has been outstandingly successful and could be used as a model for developing systems for other commodities in which the government has heavy direct involvement. The system has been responsible for developing high yielding, good quality varieties, obtaining producers' adoption of the better varieties and improved production practices, and for delivering to mill markets a product of a quality and form competitive with that produced anywhere in the world. The established prices, although below the price to producers in other countries, has been adequate to make cotton production attractive to growers relative to competing enterprises. This fact is demonstrated by the necessity of establishing programs to limit area and production. Establishment of dependable procedures for quality determination in which growers have confidence and payment to growers of price differentials for quality in line with those in world markets have been major factors in assuring production of a high quality, high value product. Steps have also been taken to assure maintenance of quality through the marketing process and to provide efficient, low-cost services. Temporary outside storage at receiving points provides adequate protection and minimizes costs. Wasteful practices followed in many other countries of multiple sampling and pressing have been eliminated. Many small, inefficient gins with obsolete equipment also have been eliminated. The rate of utilization of ginning capacity is very high and

compares favorably with that of other producing countries. Transportation services appear to be adequate and costs to be reasonable. Processing of cotton fibers is the responsibility of the General Organization for Textile Industries. It uses 20 to 25 percent of production in making cotton or blended cotton and synthetic yarns and textiles but falls short of domestic demand. Facilities are old and inefficient. Planned renewal and construction of new facilities have not materialized and productivity of labor as measured by value of output per worker, continues to be the lowest of any of the manufacturing industries.

The performance of the livestock products marketing system has varied among specific commodities, between levels and over time. Overall its performance would have to be rates as rather poor. With increasing incomes, per capita and total demands have risen more rapidly for livestock and associated products than for crops. Domestic production of poultry, meat, eggs and dairy products has increased markedly in response to the increased demand, particularly since 1973-74, and price increases have been in line with increases in the consumer price index. Beef production also has risen but not as rapidly as demand, and price increases have been proportionally greater. Production of mutton and lamb fell sharply in 1974 following several years of declining sheep numbers due to shortages of feed, particularly range feeds. This decline was offset to some extent by imports, but total supplies fell and still are below the levels of a decade earlier. Price increases have exceeded those of any other major commodity. Marketing of the nonprocessed products, such as milk sold by producers directly to retailers or consumers, appears to be provided at low costs but services to consumers are limited and sanitary conditions often unsatisfactory. Processing facilities, including dairy and slaughter plants, generally are operated well below capacity and costs are high. Volume of these public sector facilities is affected by prices they are permitted to pay producers. This makes it difficult for them to compete with the private sector for supplies. Also marketing margins allowed slaughter plants are not adequate to cover costs and they often limit the volume handled in order to reduce overall losses. Taking these constraints into account, most of the facilities appear to be operating in a fairly efficient manner. Because they are operated as monopolies, however, there is no standard against which their efficiency can be evaluated.

Conclusions

Many of the problems in marketing stem from some price controls, lack of investment in modern facilities, lack of experience of managers of publicly owned operations, and from risks and uncertainties of a country in transition from less to more public control. Specific problems of marketing management and operations, however, can be substantially improved in both public and private operations. For products to have the highest

value to consumers they must be delivered at a time and in the desired form and at a convenient place. This requires a system with effective rules of commerce, with flexibility to adjust to changing conditions and with clear lines of authority and responsibility. Furthermore, it is helpful to understand those marketing activities where government is required to achieve efficiency and those where private control is more efficient. In areas where only one or a very few firms can operate efficiently higher performance toward achieving society's goals may be achieved by government operation, by government as a competitor, or by private operation and government control of prices or cooperatives.

On the other hand, where a fairly large number of firms can compete, the industry is likely to perform better in the private sector with government providing and enforcing the rules of competition and allowing the market to set prices. In most small countries, regardless of whether enterprises are publicly or privately operated, prices should be kept generally in line with international markets by maintaining low trade restrictions. Specific conclusions and recommendations are noted in the following section.

1. Uncertainty and the policy of increased public control has stagnated the food wholesaling and retailing business which is still mostly private. Suggested policies to increase performance in this area are:

- a. Publish a clear policy that food retailing is to remain primarily in the private sector and encourage investments with government loans and assistance for building new facilities. Aid transition of excess labor into more productive employment.
- b. Government plan with the private sector and build modern facilities for storage, wholesaling, grading and sorting. These could be leased to private operators on a competitive bid basis.
- c. Limit price control at retail to a minimum number of basic items. There is adequate competition at the retail level to protect the interest of consumers.

2. Fresh fruit and vegetable marketing has performed reasonably well and marketing margins have remained relatively low. The same recommendations as in (1) above apply. In addition, it appears that there is no need for price controls at any level on these products. There is sufficient competition to protect producers and consumers. Government efforts could be best directed at developing grades and standards, maintaining competition, fostering desirable trading practices and dissemination of market news. A project to cooperate with other Arab countries to

develop uniform grades and standards for fruits and vegetables would greatly facilitate trade.

3. Cereals marketing is dominated by government with both producer and consumer prices substantially subsidized. This is a political decision, but it reduces efficiency in marketing; reduced subsidies would decrease the economic distortions in marketing. In terms of cereals marketing operations, handling efficiency is poor because of lack of bulk handling. Local bulk storage such as metal or concrete bins to start the bulk handling process and reduce the peak demands on truck transportation is required. A detailed study is needed to determine the optimum number, size and location of this local storage.

4. Commercial food processing is mostly operated by government. Most plants appeared to be well operated when decisions were under control of the local manager, but lack of flexibility in employment and in procurement marketing policies resulted in inefficiencies and idle capacity. Management programs to increase training, delegate authority, improve accountability and evaluate performance are badly needed. As incomes increase and if more women enter the work force, much more food processing capacity will be needed.

Overall, food processing lacks the facilities, capacity and technology to produce the necessary quantity and variety of products for Syria and many products are imported. In some cases joint ventures with international companies would appear desirable in order to acquire the necessary investment, technology and management for products not currently produced. In the meantime, trade barriers and restrictions are generally too severe. A comprehensive study of the market for processed food and the feasibility of serving the market with domestic production and processing is needed.

5. Cotton marketing is an efficient government monopoly. The equity dimension of performance could be improved by paying producers a price nearer world market levels. Cotton is harvested by hand and there is opportunity to improve labor productivity by moving toward machine harvesting. Most of the changes must come at the farm level; however, close coordination with The Cotton Marketing Organization (CMO) is needed to handle the machine-harvested cotton. Productivity in CMO could be increased by the use of a minicomputer to handle the accounting work and to aid financial and operational control and evaluation.

Evidence of the good performance of CMO is that marketing costs are apparently equal to or below those of the U.S. This may be partially due to a lower wage rate. The procurement and sales programs are based on pricing on the basis of quality. The product delivered to buyers is

of reliable quality, they know the kind of product they are purchasing and can depend on its being precisely as specified. As a result, it brings at least the average price of cotton of like quality and staple length in world markets. Both buyers and producers receive prompt and fair treatment and service. The procurement, ginning, quality determination and sales appear to be efficiently organized and operated.

6. Livestock market facilities in Syria consist mostly of a place where sellers can bring livestock for sale. The largest market in the country at Aleppo does not have pens for holding individual flocks or loading and unloading facilities. The basic facilities for a modern, well organized livestock market should be provided in each place where substantial trading occurs. A study to provide a basic design and organization for a model market would be a good investment. If this pattern proves useful, other markets can then be designed using this model.

7. Syria is in a strategic position in sheep marketing in the Middle East. Demand for meat will grow rapidly in the future. There is surprisingly little market organization and market coordination in livestock and meat marketing, processing and distribution. A Sheep Marketing Board or a Livestock-Meat Marketing Board could be established to coordinate, establish policies, and produce market information that would be useful in improving performance in livestock and meat marketing. Future demands in the Middle East will provide great opportunities for Syria to serve as a fattening and trade center for sheep if the industry is designed to take advantage of these opportunities.

8. Despite only two modern livestock slaughter plants in Syria, these plants have underutilized capacity; the sanitation and quality they are designed to produce is not being fully utilized because of management and administrative problems. A board with authority to study and carry out policies to improve performance of these systems should pay large dividends.

9. Butcher shops and meat stores are generally very inefficient, with low labor productivity mainly due to a shortage of adequate space and facilities. Because of the lack of incentives for private investment, government could design and build modern facilities and lease these to private operators on a competitive bid basis. There are adequate skills and competition in the private sector. Government's role should be to see that satisfactory facilities are available, to set and enforce grades and standards, and to assure the private sector the flexibility to serve customers.

10. Poultry meat and egg production and marketing are among the best performing industries in the agricultural sector. Although government is a significant factor in the industry, the private sector accounts

for the largest volume. Modernization started late compared with most countries, but by 1979 enough progress had been made for the country to become essentially self-sufficient in poultry, meat and eggs. There is adequate competition in these industries and the fact that government is an important producer and marketer makes price controls unnecessary. There is no need for additional expansion of government facilities.

11. Dairy marketing in Syria is mainly in the hands of small private producers and operators despite the fact that the government operates the three modern plants, all of which are underutilized due to administrative, management and marketing problems. Syria is a dairy products deficit country and this is likely to continue as it does not have the necessary production resources to produce economically all of its needs. This is such an important food group for good nutrition that a national study is needed to examine the total dairy marketing, trade and price policies which would provide improved performance of the national dairy industry.

12. Finally, international trade is often inefficient because of rigid regulation, monopoly on some trade items, and the necessity to get specific trade permits. In short, both public and private companies should be allowed fairly easy access to international markets. This can be designed to maintain pressure on the entire marketing system to be efficient and respond to the changing needs of the society.

D. Marketing Farm Inputs

In assessing the marketing system for farm production inputs, attention was given both to agricultural credit and to physical inputs including feed, fertilizer, fuel, insecticides, machinery, seeds and breeding stock.

Agricultural Credit

Syria's oldest lending agency, The Agricultural Cooperative Bank (ACB) plays a unique role in distributing production inputs to farmers. Since most farm inputs are made available, or are controlled through the ACB, particular attention was given to its operations, both at the micro and macro levels. Other public and private sources of capital were also considered within the limits of available information.

In examining the adequacy of existing systems for financing both annual operating expenses and capital formation, constraints to the system were assessed, and where deemed appropriate, additional projects or possible changes were suggested. Findings and recommendations are summarized as follows:

1. Syrian agriculture has failed to keep pace with the rate of growth experienced by the other major sectors in the Syrian economy since 1970. The volume of loans made by the ACB more than doubled during the 1970-78 period. However, this rate of increase was way below the growth rates for the Commercial Bank and other specialized banks.
2. The impacts of the slower rates of growth in ACB loans have been most noticeable in the private sector, which increased only 52 percent between 1970 and 1978, compared with an increase of 268 percent in the cooperative sector.

It is recommended that an assessment be made of the relative marginal productivity of capital added to the private, cooperative, and public sectors. The results of this study could help the High Committee for Agriculture better determine if the present allocation of ACB among these sectors is appropriate, given the Syrian desire for increased agricultural production.

3. Short-term cash loans to farmers by the ACB have declined sharply relative to other loans by the bank since 1970. Although medium and long-term loans increased significantly, the volume of such loans still falls short of Syrian agriculture's need for mechanization.

Most short-term, operating loans have a high payoff to producers. Hence, the advisability of the present relative cutback in short-term loans appears questionable. While the commitment to increase medium and long-term loans is commendable, such loans should not replace short-term loans. Instead it is recommended that the ACB be permitted to discount its intermediate and long-term loans to private borrowers as well as to the cooperative sector with the Central Bank as an additional source of medium and long-term funds. A long-term educational and promotional program by the ACB to increase bank deposits from the private sector can supply additional funds for medium and long-term lending.

4. Cotton has had preferred access to ACB loans relative to other crops. Although there is a trend away from this favorable position for cotton, noncotton producers are still at a disadvantage in their access to ACB loans. Whether or not this favorable access to ACB financing is warranted by cotton's role in foreign trade should be evaluated.

5. The amount and timing of both in-kind and cash loans are specified in the annual Decree of Input Requirements published by the High Committee for Agriculture. The details of these needs by crop or livestock enterprise are outlined in tables in Chapter IV of Volume 4. The quantities are established as national averages for irrigated and nonirrigated zones. They do not vary by soil quality or by differences in management capacity of borrowers. Studies are underway to determine in productivity responses for different Syrian soil types as a basis for varying the fertilizer allocation among soil types. This is a good approach to increasing the flexibility of input allocation as a means of increasing agricultural production.

A study of relevant criteria for evaluating management capacity of borrowers and estimating differences in productivity from varying fertilizer applications associated with different levels of management capacity is needed. In the absence of such studies, it is suggested that varying inputs (seeds, fertilizers, etc.) allocations according to the previous year's yields would be a shift in the direction of allocating resource inputs to get increased agricultural output.

6. To obtain a crop loan from the ACB a borrower must first obtain a license specifying the amount of each crop to be grown. When the license is approved at the Mantika level, the ACB will allocate the in-kind and cash amounts specified in the Annual Decree. On the surface, this system appears to be very inflexible. However, a comparison of actual versus planned hectarages planted suggests that farmers deviate substantially from the assigned or planned hectarages of nonirrigated crops in response to changing weather or other conditions. They also appear to make substantial shifts in irrigated hectarages in response to changing economic conditions. Attempts to reduce farmers' flexibility to make these adjustments would be counterproductive, given the high degree of weather variability and economic uncertainty under which farmers operate.

7. Rates of interest charged on ACB loans are highly subsidized, being 4.0 percent for cooperatives and 5.5 percent for both public firms and private individuals. The rate to private individuals increases to 7.5 percent for loans exceeding 50,000 SL. Because of these subsidies, severe limits are placed on the maximum size of loan a branch manager can make to individual borrowers - 80,000 SL for short-term and 20,000 SL for medium and long-term loans. These limits apply equally to all branches. It is recommended that the size limits be varied among branches according to the needs of the area and the demonstrated credit management skills of the manager and his staff. A desired target is that each branch manager have lending authority to permit the branch to handle 85 percent of its loan applications.

Loans requests beyond the branch manager's lending authority are handled by an ACB headquarters committee which allocates up to 100,000 SL for short-term loans and 60,000 SL for medium and long-term loans for individuals. Loans beyond these limits must be approved by the Director of the Central Bank. The loan limits for cooperatives are 1 million SL for medium and long-term loans, with approval of the ACB headquarters committee. This limit can be exceeded with the approval of the Director of the Central Bank and the intercession of the Peasants' Union.

Regulations permit and officers of the Central Bank, ACB headquarters, and at many branches seem to favor meeting the loan requirements of larger borrowers. However, a number of larger private operators are not turning to the ACB for financing, apparently because they believe its lending programs are too restrictive to meet their needs. It is suggested that a program be developed to inform the more productive private operators and cooperatives about the flexible lending limits permitted within present policy.

One argument against a policy of making more loans available to the larger, more effective producers is that the rates charged by the ACB are highly subsidized. To avoid subsidizing these growers who probably do not need it, we suggest that consideration be given to further increasing interest rates when the loan exceeds a given amount (say 100,000 or 150,000 SL) to a rate more nearly approximating the free market level.

Strict loan size restrictions currently exist in terms of the maximum loan that can be made to a single grower for individual crops. These maxima are 40,000 SL for cotton, 25,000 SL for cereals and 10,000 SL for other crops. These restrictions seriously constrain farmers in their efforts to mechanize and to achieve operating efficiencies. It is recommended that the loan limit for a specific crop be eliminated.

8. The team was asked to consider and comment on the advisability of transferring the ACB from the Ministry of Economics and Foreign Trade to the MAAR. Some advantages in this transfer are recognized. The advantages however, are more than offset by disadvantages and risks to the entire economy. Moreover, it appears that most of the current financing problems are the result of policies and procedures that can be modified within the present arrangement.

9. Although the ACB is the primary sources of credit to Syrian farmers, there are a number of other sources:

- Both the Commercial and the Industrial Bank make loans to agriculturally related firms, some of which are used to finance the sale of their products to farmers.

- The General Machinery Company (GMC) in its responsibilities for distributing tractors and other machinery, finance about two-thirds of all the new farm tractors sold in Syria as well as other large machinery.

- Merchants continue to channel a significant volume of funds into agricultural production. This is particularly true for fruits and vegetables and for livestock products marketed through the souks in the larger cities. The middleman or "damman" still plays an important role in this marketing and financing process. Similarly, food processors finance the production of many of the raw products for their processing plants.

- The Tobacco Monopoly is an important source of agricultural financing for those farmers who grow tobacco.

- Grants and loans from a number of foreign nations and international institutions have channeled capital into Syrian agriculture. Such outside funds will probably continue to provide a significant capital flow in the near future. Over the longer range, however, Syria will need to develop its own sources of both operating and investment capital.

- Self-financing (retained farm earnings, depreciation and off-farm income) is also an important source of new capital for Syrian farmers. Better estimates of the magnitude and circumstances of this source of funds are needed. Moreover, an effort should be made to determine the desirable level of self-financing in order to insure that "forces" savings and re-investment in the farm enterprise is not competing with such social objectives as education, improved health care and community services.

Marketing of Physical Inputs

The efficient flow of agricultural production inputs in a large measure determines the overall productivity of the agricultural sector. Several aspects of the existing marketing system have created problems for Syrian farmers.

Capital for use in building permanent storage facilities and purchasing farm machinery has not been adequate to keep up with the increasing demand. First, while storage capacity has increased over time, it has not nearly kept pace with the increase in demand for such facilities. The deficiency in capacity is the result of insufficient capital outlays for the construction of additional storage facilities for feed, fertilizer and seed. Although plans have been made to increase capacity over time, current plans are inadequate to meet the growing demand for storage of agricultural inputs. The shortage of storage capacity places Syrian livestock producers in an especially precarious position in terms of not having facilities to handle the emergency feed reserve. Not only is the storage capacity inadequate to handle the proposed feed reserve, but when combined with the annual feed carryover stocks and annual feed consumption, the problem becomes intensified. Without additional storage there is the possibility of misallocation of feed to various regions of the country. The result is that there are excesses in some areas and deficiencies in others. The feed then requires redistribution to the proper location when storage becomes available; this is both time consuming and costly in terms of transportation expenses. Second, the terms of loans to finance the purchase of agricultural machinery are so structured as to pose significant financial burdens on small farmers who are attempting to mechanize. Although the interest rates are low, the length of the loans appears to be too short for many borrowers. The high payments required to pay off the loan over a five-year period prohibit many small farmers from purchasing machinery.

There also appears to be a lack of qualified field extension personnel to assist farm operators in improving their farm production practices. Without trained field support the dissemination of improved production information to producers is difficult. Attempts at increased mechanization can only be realized if the farm operator can be shown the benefits of their use over animal or manual labor. The distribution of dairy cows to small farmers throughout the country and the resulting problems reinforce the need for farmer oriented extension work. For example, many of the farmers who purchased dairy cows did not understand the need for proper nutrition in order to achieve high milk production levels; they did not provide enough green fodder, which significantly reduced milk production.

The delivery of inputs from the ports to the various distribution stations throughout the country is a major bottleneck in the farmer's production process; it can cause delays to the farmer in planting his crop. These delays can mean the difference between a good crop and a poor crop. A related problem involves the distances the farmer is required to travel in order to pick up his inputs. Local distribution stores are often not located close to farm operators and collection of inputs by the producer becomes very time consuming.

The following recommendations for implementation in the Fifth Five-Year Plan are proposed to alleviate some of these problems and to increase the efficiency and flow of agricultural inputs to Syrian agricultural producers. The recommendations are presented in order of priority as potential projects.

1. Storage capacity for feed grains is not adequate at present and will continue to be a problem in the future unless some affirmative action is taken. Additional storage facilities for all types of feed grains, fertilizers and seeds need to be built. The most critical need is in the area of feed grains, however. Projected livestock numbers during the Fifth Five-Year Plan establish the need for considerable expansion in feed grain storage capacity. The need for additional capacity will be even greater if the feed reserve becomes a reality during the Plan.

The feed storage facilities could be of two types - tower silos or small, flat concrete buildings. In the areas of concentrated livestock production, centrally located large tower silos would probably provide the most efficient means for storing both the feed reserve and annual feed consumption. On the other hand, small, flat concrete storage buildings could handle the feed storage requirements for both private producers and areas of unconcentrated livestock production. A study should be conducted to determine the costs and benefits of both types of storage facilities. Time is of essence, however, as the storage capacity for feed grains as well as other inputs is woefully short of what is needed.

2. An intensification of domestic feed production is needed to alleviate some of the burden of foreign exchange resulting from increasing imports of livestock feeds. The domestic feed production program should emphasize both green fodder and feed grain production. Syria has an ideal climate for high quality green fodder production. Assistance from the government in defraying the initial planting costs of the producer as well as guarantee in the form of a subsidy on production would no doubt provide the needed incentive for farmers to increase green fodder production. Special financing considerations on forage equipment purchase through the ACB would also enable farmers to increase their green fodder production more easily. In addition, if the benefits of growing green fodder crops in contrast to other cash crops were demonstrated to farmers at local extension type meetings, many farm operators would probably respond by increasing production.

Increased production of feed grains with special emphasis on maize and sorghum would also help relieve the increase in imports of these feed components by the poultry and dairy sectors. Experimentation with drought resistant feed grains should also be explored for possible use in the marginal rainfall areas of Syria.

3. A study of the economic feasibility of building bulk handling facilities at the ports for both imports and exports of agricultural inputs is needed. The costs and benefits of implementing such facilities should be thoroughly investigated, keeping in mind the likelihood of increased port use during the Fifth Five-Year Plan. Bulk handling facilities would not only decrease labor and material costs, but also enable faster delivery of inputs from the ships to the farmer. Of course, to utilize bulk handling fully delivery of bulk materials to local warehouse has to be implemented. Many areas probably do not have sufficient demand for bulk deliveries to warrant local facilities being built. However, in areas where large quantities of bulk material can be utilized, the savings from using this kind of system appear to warrant serious investigation. The final step in the bulk handling process would be to have large livestock or crop producers install bulk handling facilities on their farms. It is proposed, therefore, that several pilot projects be instituted using bulk delivery of feed to both local stores and large livestock producers. If these projects prove to be economically successful then the program should be expanded to include more farm operators.

A transportation study to determine the most efficient means of fertilizer distribution would assist in identifying the adequacy of the current system. This information is particularly important with the addition of the new fertilizer plants and their corresponding output. An assessment of the adequacy of the distribution system to handle both current and expected domestic production would help identify the best method and timing of fertilizer deliveries for both domestic consumption and exportation. This study should include analysis of the feasibility of bulk deliveries of fertilizer to large-scale crop producers. A pilot project which would involve the delivery of fertilizer to selected crop producers in bulk rather than bags is recommended. Successful implementation of such a program could provide significant savings in fertilizer distribution for both the fertilizer plants and the ACB. These savings could then be passed on to the farmer in the form of lower fertilizer prices.

4. Power generating facilities in industrial sections of the country need to be examined in light of the anticipated increase in demand during the Fifth Five-Year Plan. At present, the power facilities near Homs are inadequate to meet the power needs of industrial customers. Without a sufficient power base the industrial sector cannot fully utilize its resource base.

5. A study to assess how the cooperative machinery program is functioning would be worthwhile because it appears there are some inequities in cooperative machinery use. Actual machinery use by each cooperative member in a few selected cooperatives would provide a good indication of how the program is working. If there are misallocations of machinery-use time among the members, a strict allocation program might be needed so that all cooperative members have an equal opportunity to use the machinery.

6. Serious consideration should be given to going ahead with the proposed building of a chemical formulation plant in Syria. With the chemicals formulated within the country, adequate testing and safeguards could be established to insure against potential problems due to outside nonuniform chemical testing procedures. There would be a constant supply of chemicals to Syrian farmers; special insect or disease problems could be addressed within the country without relying on outside sources. The plant would provide employment opportunities and increased expertise in this area of increasing importance in agriculture and the project could provide a potential exporting product for neighboring countries, thus helping the Syrian foreign exchange situation.

7. Increased use of aerial insecticide application requires that either the MAAR purchase additional planes or allow private individual to engage in aerial application. The use of private aerial service would enable the MAAR to place its capital resource in other areas such as extension training programs rather than in buying additional planes.

8. Careful analysis should be made of the costs and benefits of producing urea fertilizer domestically given current economic conditions. It appears that Syria would be economically better off to export its petroleum products and import its fertilizer needs. The use of natural gas as a substitute for naphtha should be considered.

9. The seed improvement program in Syria has recently undergone rapid and monumental changes. As with any program that results in rapid changes, some confusions are bound to occur. Greater effort is needed in following up on trouble spots to speed the feedback which can help prevent reoccurrence. An in depth study of the seed production and delivery systems would provide important insights into the changes in procedures required to improve the efficiency of each seed delivery system. It would also assist in identifying which parts of the production/marketing systems are most likely to yield the greatest benefit from change and what training programs are most needed to implement these changes.

10. Some of the skills that are lacking in the seed improvement program are already apparent to the Seed Organization. Provisions need to be made in the next Five-Year Plan for training programs to upgrade the skills of Seed Organization personnel as well as to provide additional skilled personnel for the already planned expansion. These training programs should be coordinated with the appropriate foreign and international organizations which are ready to provide assistance.

11. An extensive training program for farmers on proper dairy cow care could both increase milk production and decrease calf mortality rates. This training program could be presented on a local basis by either livestock specialists or successful dairy farmers.

E. Syrian Economy Planning Model

Because of the interdependencies among the production sectors in the Syrian economy, an assessment of its agricultural sector should necessarily consider the effects that the productive capacity of this sector and its planned utilization have upon the rest of the economy. This assessment should also consider the effects that the capacities of those sectors which supply inputs or process agricultural output and their plans for utilizing existing capacity have upon the ability of the agricultural sector to meet projected final demand. In short, what is needed is a planning model that accounts for the interdependencies between production sectors and, under alternative annual production plans, indicated the economy's ability to meet projected levels of final demand.

The planning model developed for the Syrian economy gives particular emphasis to the agricultural sector and the linkages between this sector and the rest of the country's economy. The approach adopted to account for these interrelationships was first to develop a system of simultaneous production functions for the production sectors in the Syrian economy. The direct requirements for primary inputs (i.e., labor, fixed capital and government services) and the goods and services provided by other production sectors per unit of gross output for each sector, reflect the parameters for each sector's production functions, the productive capacities of each sector and the availability of primary inputs. These measures make it possible to estimate the economy's gross output and each sector's contribution to gross domestic products for the specific production plan being studied. The procedures followed in constructing this planning model are explained in Volume 4 , Agricultural Marketing, along with specific recommendations for later modifications when additional data become available.

Three scenarios to 1985 and 2000 were examined with this model. The three were developed consistent with the three alternatives assumed in the commodity demand projections made in the Commodity Demand Assessment, Volume 4 , Agricultural Marketing.

In the three scenarios run for 1985, Alternative I builds upon the 62.5 percent increase in per capita expenditures and 44.9 percent increase in population; it places the greatest demands upon the Syrian economy. Assuming no exports of Syrian products, the production sectors must produce 75.7 billion SL of goods and services if it is to satisfy intermediate and final demand. At the opposite end of the spectrum, only 49.2 billion SL of goods and services would be needed under Alternative III. If the Syrian government desires to export any of these commodities, the final demands assumed under each of the scenarios must be expanded accordingly. If the Syrian economy does not have the capacity to meet the intermediate and final demands projected under Alternative I-III, the government will have to import goods to satisfy these demands.

In the three scenarios for the year 2000, Alternative I again placed the greatest strain on the capacity of the Syrian economy. If the Syrian government has hopes of exporting specific commodities, the capacities of those sectors that produce these commodities will be strained even further. It is important to note some of the assumptions underlying these projections which have been set forth in Volume 4. For example, we have assumed that the processes used to produce goods and services in the 1970s will remain unchanged by the years 1985 and 2000. To the extent that the relative use of specific inputs changes, their direct requirements and hence intermediate demands for goods and services produced by other sectors will differ from those projected in this report. We also assumed that the production capacities of each sector would not limit its ability to meet the intermediate and final demand for its products. The purpose of these projections, however, was to show what the output of each production sector would have to be in 1985 and 2000 rather than what the potential output of the economy and its sectors will be. This issue can easily be addressed with the planning model developed in this study once these capacities are known. Thus, the production capacities of the individual sectors can serve as upper bounds in a constrained solution of the planning model to show what the potential output and domestic product of the economy can be in these years.

Conclusions

1. Although it is not possible to make specific recommendations on the basis of the runs made so far with the Syrian Economy Planning Model, it is appropriate to recommend that the model be used in evaluating alternative policy recommendations in the Fifth Five-Year Plan.

It is important that the potential uses and misuses of the planning model developed in this study be clearly understood. It is also vital that its users understand how to disaggregate the model further and update the technical coefficients and capacity constraints as new information becomes available or as different assumptions regarding technological change and capital formation are made.

2. It is also appropriate to recommend further development of the model. The approach taken in developing this planning model was to use the best information available. Our major goal was to make this model operational so that we could illustrate the types of analyses it can perform. As additional and more precise data are made available, the technical coefficient and capacity constraints in the model can easily be modified.

3. Priority should be given to examining the direct requirements used for the crop and livestock production sectors in the model. In addition, irrigated and rainfed options should be allowed for crops other than wheat, where applicable. Further emphasis should also focus on disaggregating the food processing and beverage (FODBEV) sector to track more clearly the effects of production plans for specific agricultural commodities.

Once the desired disaggregation of the nonagricultural sectors has been achieved, the next step is to survey the managers of firms or government agencies associated with these sectors to determine their current productive capacities. Questions about current output and the fraction of maximum potential output this represents would allow determination of their productive capacity. Once these values are known, the feasibility of alternative production plans for the agricultural and non-agricultural sectors in the short run and the added capacity needed to meet projected final demand for goods and services in 1985 and beyond can be assessed.

Syria: Agricultural Sector Assessment

Volume 1: Summary Report

CHAPTER V

HUMAN RESOURCES AND RURAL DEVELOPMENT

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CHAPTER V

HUMAN RESOURCES AND RURAL DEVELOPMENT

Human resources are an important segment of the Syrian Agricultural Sector because, for the most part, the potential improvement in the efficient use of natural resources will depend upon the wise judgment and cooperation of the people in the country.

Syria has been endowed with an enterprising and mobile people, but an extremely high rate of population growth is exerting considerable pressure on the adjustment of human resources as change takes place.

Along with the population growth, there is significant migration from rural to urban areas -- 66 percent of the total migration now is from rural areas to Mohafazat and other urban centers. The people leaving the rural areas tend to be in the 15 to 39 age bracket. This movement of people in the most productive period of their lives allegedly is creating a labor shortage in the rural areas.

A high level of illiteracy in the rural population reduces occupational opportunity for these people as they migrate to the city, and adds to the cost of social services required by them.

The development of Syrian natural resources will be determined to a great extent by the quantity and quality of human resources that participate in such development. To expand potential agricultural production requires knowledge of the number and characteristics of the people likely to be available and involved.

These people will be affected by the relative levels of living in rural and urban areas, and government policies can affect this relationship. Since life in the rural areas is going through dynamic changes, this chapter highlights the effects of some of the major trends and suggests ways to make this change most effective. The detailed reports upon which this chapter is based are presented in Volume 5, Human Resources and Agricultural Institutions Annex.

A. Population and Migration

Syria is presently undergoing very rapid population growth with the natural rate of increase in total population estimated at 3.7 percent annually in 1976-77. The rate for rural areas is higher, 4.1 percent, while the rate in the urban area is 3.3 percent. This puts Syria among the countries with the highest growth rates in the world and slightly higher than other Mideast countries as indicated by the following estimates of natural increase:

<u>Area</u>	<u>Percent</u>	<u>Area</u>	<u>Percent</u>
Syria, Rural	4.1	Saudi Arabia	2.7
Syria, Urban	3.3	Egypt	2.1
Syria, Total	3.7		
		Central America	3.2
Iraq	3.4	Africa	2.5
Jordan	3.2	Oceania	1.5
Iran	2.8	Europe	0.6
		United States	0.6

Rural areas in Syria have an extremely high birth rate of about 49.5 children annually per 1,000 females of childbearing age compared to 41.0 for urban areas. The greatest difference between rural and urban is for women between 25 and 39 years of age. Although urban areas have lower "rate of natural increase", these areas are usually increasing faster than rural areas in total population growth due to migration from the farm to town.

Even conservative estimates of projected future growth for the country as a whole by the Central Bureau of Statistics (CBS), suggest a population in Syria of 8.979 million in 1980 and 17.085 million by year 2000. This high growth phase is due to relatively low mortality (life expectancy of 63 years) and a very high fertility rate.

While the total fertility rate (TFR) for the total population of women ages 15-49 is estimated at approximately 7.5, the TFR for women with an intermediate level of education is approximately 4.2. The national population projection assumes that education levels will increase among women through the year 2000, and that the relationship between education and fertility will remain strong. Hence, the optimistic fertility projection is that the fertility level of the entire female population in 2000 will average the same as that of intermediate educated women in 1976 -- 4.2 rate. Currently the fertility rate for rural areas is 8.8 children during the lifetime of the average woman and 6.1 for women in the urban areas.

Growing Population with Fertility Decline

Demographic momentum will result in the population continuing to grow rapidly even after considerable decline in fertility. The age structure of the population is such that the coming years will see increasing absolute numbers of women entering the childbearing ages.

As a result, even with the projected decline in total fertility, which assumes a decrease in fertility levels at each age group of 11 percent during the five years 1980-85, population will expand rapidly as shown in the following tabulation.

<u>Year</u>	<u>Male (000)</u>	<u>Female (000)</u>	<u>Total (000)</u>	<u>Annual Growth Rate To End Date (%)</u>
1975	3,798	3,640	7,438	3.52
1980	4,570	4,409	8,979	3.84
1985	5,479	5,302	10,781	3.73
1990	6,481	6,293	12,774	3.45
1995	7,565	7,357	14,922	3.16
2000	8,656	8,429	17,085	2.74

The 11 percent decline in total fertility assumed by CBS during 1980-85 is likely to be overly optimistic. An 11 percent decline would be a very fast decline even in comparison to other developing countries with a family planning program activity underway. However, family planning in Syria is in an infant stage of development and its contribution will depend largely on the support provided by the government.

Fertility Intermediate Variables

Fertility is only indirectly influenced by socio-economic, cultural or environmental variables. However, fertility is directly affected by what have been termed intermediate variables which can be listed as follows:

- I. Exposure to Having Children
 1. Proportion marrying
- II. Deliberate Marital Fertility Control
 2. Contraception (family planning to avoid conception)
 3. Induced abortion
- III. Natural Marital Fertility
 4. Lactational infecundability (infertility while nursing)
 5. Frequency of intercourse
 6. Sterility
 7. Stillborn children and natural abortion
 8. Duration of the fertile period (years able to have children).

The important socio-economic factor, education, and, for that matter, its correlate of occupational level, is generally presumed to influence fertility by opening up to the individual a wider range of possible living styles and thus affords an incentive to reduce family size.

For planning purposes, we should concentrate on three of the intermediate variables: (1) the proportion marry; (2) contraceptive use; and (3) duration of the marital fertile period. Educational attainment, labor force participation and social mobility via occupation tend to result in lower total proportions marrying and in greater use of contraceptives. Thus, later marriage tends to give a shorter period of marital fertility. By far, the most effective and fastest way to reduce fertility is contraception.

Careful monitoring of the relationship between education levels, proportions marrying, contraceptive usage, age at marriage and fertility will show how well the proposed decline in TFR from 1970 to 2000 is progressing.

Two distinct policy alternatives are possible which have lowered fertility as their outcome:

The first is to identify, for the Syrian population, those factors which are most closely related to the intermediate fertility variables, and then attempt to effect favorable changes in levels of the indirect, casually prior variables. Thus, policies might be designed to raise educational attainment levels or bring women into the labor force, both of which should result in overall fertility reduction. This is because better educated, working women will tend to marry in lower total proportions, marry later in their lives after the passage of some of their most fertile years, and to use contraception.

Should it be deemed necessary to effect more rapid and more assured declines in fertility, a second policy alternative is to influence the magnitude of the relationship between factors, such as education, and intermediate variables. Thus, for example, programs such as family planning, which make contraceptives available and socially acceptable, can increase the magnitude of the relationship between education and contraceptive use and will directly affect the level of contraceptive use.

Mortality Rates

While the crude death rate for the entire country is about 8.5 (per 1,000) it is 7.5 in urban areas and 9.5 in rural areas. Mortality differentials associated with urban versus rural life generally reflect differences in lower standards of living in the rural areas, as well as cultural traditions, and availability of health care services.

To a considerable extent, the total difference is due to sizable differences in mortality in the first year of life, i.e., infant mortality. The Follow-up Demographic Survey estimates the infant mortality rate at about 58.0 per 1,000 in urban areas and 71.1 in rural areas with an average of 65.6 in the total population. Certainly, further efforts should be made to reduce infant mortality, especially in rural areas.

Further details on the general relationship between mortality levels and urbanization is provided in the Human Resources Annex.

Migration Trend from Rural to Urban

Migration is a selective process with a much higher proportion of certain types of people moving than others. For example, the people leaving rural areas in Syria tend to be in the 15-39 age bracket. And the migration process from rural areas involves slightly more men than women. This tendency of migrants from rural areas to be in the most active period of their lives and to be concentrated among males may be one of the factors behind the alleged labor shortage in rural areas, where an unusual proportion of elderly, young children and females remain.

In general, there appears to be little change in total population in Syria due to either in - or out - migration. There is substantial movement across Syria's borders, but those leaving are numerically replaced by those entering.

The significant migration in Syria is from rural areas to the larger and smaller urban centers. Conclusions from these data include:

1. The bulk -- 66 percent -- of the total migration was from rural areas to Mohafazat centers and other urban centers. Migration from other urban centers to Mohafazat centers was 12 percent; from Mohafazat Centers to other urban centers was 12 percent; and from Mohafazat Centers to rural was 10 percent.
2. The population composition in urban areas is changing due to in-migration from other areas, with approximately 15 percent of the Mohafazat centers and 25 percent of other urban centers being immigrants.
3. There are counter trends, but they tend to be insignificant. One person moving from a Mohafazat center to the rural areas meets five people on the road coming from rural areas to the Mohafaza center.

Net Migration Change by Mohafazat

While we can not truly assess the timing of the flows involved, we can gauge the relative importance of migration to total population growth in each Mohafazat. The following tabulation is based on data from the

1970 Census of Population and published in the 1978 Statistical Abstract. For a discussion of how "net migration" by Mohafaza is calculated as percent of a previous population, see the Human Resources Annex.

<u>Mohafazat</u>	<u>Net Migration as Percent of Previous Population</u>	<u>Mohafazat</u>	<u>Net Migration as Percent of Pre- vious Population</u>
Damascus City	14.7	Idleb	-7.8
Damascus	14.3	Al-Hasakeh	0.9
Aleppo	-2.5	Al-Rakka	22.0
Homs	-0.0	Sweida	-4.9
Hama	-3.0	Dar'a	-2.1
Lattakia	-1.9	Tartous	-1.5
Deir-el-Ezzor	-4.3	Quneitra	-86.7

Al-Rakka had the largest percent increase with 22 percent, which represented a net migration increase of 43,396. But, the largest total increases in net flow were for Damascus City with 100,907 (14.7 percent) and Damascus Mohafazat with 74,635 (14.3 percent). Quneitra had a net loss of 106,571 and Aleppo 33,057. Only four mohafazat had net migrational growth.

Educational Level of Migrants

The educational background of migrants differs between males and females and among migrants of different areas.

In Damascus, the male migrants are similar to male residents except there are more male migrants with high school or more education than are male residents as a whole (24 percent versus 17 percent). More female migrants tend to be illiterates (43 percent) than the female residents in Damascus City (29 percent).

In Al-Rakka, however, the male and female migrants tend to be very similar at all educational levels to the male and female residents, both averaging about 25 percent illiterate for males and 60 percent illiterate for females. (1976 Sample Census data on sampled migrants).

In the urbanizing areas, the migration flows are tending to add more illiterate females than previously resided there.

Preparing Migrants for an Urban Society

Since rural to urban migration is likely to continue, there are at least two types of programs that might alleviate some of the problems with such movements:

First, urban areas must continue to plan to incorporate these new residents, particularly the illiterate women. Creating new housing, employment opportunities, special services, education and health services must not only be continued, but expanded dramatically.

Secondly, education and training in rural areas must help prepare the future rural to urban migrants to be productive contributors to the future urban Syrian society, again with particular emphasis on illiterate women in rural areas.

Implications to Labor Supply in Rural Areas

There are important implications to agriculture in the trends of fertility rates and migration patterns noted above.

For Syria as a whole, about 57 percent of the population was considered rural in 1970. By 1976, this proportion had dropped slightly to 54 percent. But, the percent of rural population varies widely with only the Mohafazats of Damascus and Aleppo reported as less than 50 percent rural in 1970; they remained the only two in 1976. Al-Rakka, Dar'a and Tartous were over 80 percent rural in 1970 with the latter two remaining above 80 percent in 1976. During the same period Hama and Al-Rakka both had decreases of over 10 percent in the proportion of the population that was rural. (Human Resources Annex).

The rural population of Syria increased just 600,000 in the six years 1970-76, for an annual percentage growth rate of 2.62 compared to 3.41 percent for the population as a whole. In spite of the fact that rural population grew more slowly than urban population during this period, the absolute growth in rural population was still very large. Increases in rural population for the six-year period ranged from 2.4 percent for Al-Rakka and 9.5 percent for Aleppo to about 25 percent for Tartous, Lattakia, and Idleb.

But, numbers of people living in rural areas does not reflect the number available for employment because more rural males than females of working age migrate from rural to urban areas.

Just to approach the country's goal of self-sufficiency in food, Syria will have to more than double its present output of basic food and fiber commodities within 20 years using a land base that probably will not be expanded **proportionally**, even including the projected new land in the Euphrates and other irrigation projects.

Rapid urbanization accomplished by rural-urban migration compounds these difficulties by removing ever greater numbers of people from the possibility of producing even part of the food they consume.

Summary

Syria is currently experiencing extremely rapid population growth through natural increase of between 3.5 and 4.0 percent annually. This is due to a recent decline in death rates, probably infant mortality, and no declines in fertility.

Rapid growth through natural increase will continue for some time, probably for at least a decade. Rather conservative estimates of a projected future growth (CBS-February) suggest a population of 8,979,000 in 1980 and 17,085,000 in 2000. This projection is based on an assumed fertility decline which appear to be overly optimistic and is expected to be corrected in new projections to be prepared.

Under the above mentioned projections, the dependency ratio under 15 and over 65 will decline from about 55 percent in 1970 to 44 percent in 2000.

At 1970 employment rates, the projected growth will require more than double the 1970 employment opportunities by 1990. In 1970, there were 1,429,000 employed persons and the projections by age suggest 3,160,000 available for employment in 1990 to maintain 1970 rates. This also probably underestimates the extent of the problem.

The age structure of the labor force in 1990 will be more concentrated at ages 15-39 than it was in 1970.

There are sizeable rural and urban differences in the components of natural increase. The crude death rate is about 7.5 in urban areas and 9.5 in rural areas. The infant mortality rate is estimated at about 58.0 in urban areas and 71.7 in rural areas. The crude birth rate is about 41.0 for the urban population but about 49.5 for the rural. The total fertility rates are 6.1 children in urban areas and 8.8 children in rural areas.

The rural-urban fertility differential is not entirely due to environmental or cultural differences, but can to a great extent be explained by differences in the composition (age and education particularly) of the female populations in the two sectors.

The levels of illiteracy, a key link to fertility differentials, are extremely high with nearly 85 percent of rural women ages 15-49 illiterate, and 41 percent illiterate in urban areas.

Sizeable rural to urban migration of illiterate women may be contributing significantly to urban fertility levels.

There is conflicting evidence regarding the magnitude of net migration into or out of the country. The best guess at this time, pending new data sources, is that there are sizable flows into and out of the country but little net gain or loss.

Rural to urban migration is focused not solely on Mohafazat Centers, but is spread between such very large cities and the smaller urban centers.

Past migration patterns have resulted in proportionally more children and older persons, and to a lesser extent females, in rural areas.

Damascus City is clearly, in terms of absolute numbers, the opportunity center for migrants from other areas of the country.

However, we should note that Damascus Mohafaza is rapidly growing due to spillover from Damascus City growth.

Major areas of net migration loss on a proportional basis are Idleb, Deir-ez-zor and Sweida.

Rural to urban migration is not near the theoretically high maximum possible rate and could accelerate in the future.

Conclusions

1. It should be recognized that demographic analysis of sufficiently useful quality for decision-making is an on-going process involving both description and explanatory analysis. This requires highly trained persons, but there currently exists an acute shortage of trained demographers in Syria and as a result people who could do specialized analysis must spend much time on simply "getting the data out". This is a serious problem contributing to poor morale and a "brain drain".

2. More attention should be given to the collection and analysis of demographic data, such as the following: before the 1980 census, the definition of migration needs revision and a working conference of experts should plan how census migration information is to be analyzed and reported; after the 1980 census, there will be a need for a research program in migration similar to the current National Demographic Follow-up Survey; more efforts are needed in the quantification of both internal and external migration; and, since Syria is only beginning to acquire needed information on only the most basic indicators -- birth and death rates, the National Demographic Follow-up Survey is crucial for purposes of demographic analysis.

3. The certain future high rates of growth are primarily due to fertility levels. Yet, there is virtually no recent trend data from which to analyze the true causes of high or low fertility in Syria and from which to make predictions. Analysis is needed to ascertain how education is linked to fertility in Syria -- is it through the use of contraception, delayed marriage, or what? This is an important area for a research program.

4. Given the very high fertility levels, and little evidence for an impending decline, it would be wise to review, again, the possibilities of an active program to make family planning available to all, to be used on a strictly voluntary basis by those desiring smaller families. The key to such a program in Syria would seem to be one of subtle **official** acceptance which requires less governmental involvement than active endorsement -- that is a policy of allowing couples free choice and making that choice available and acceptable.

5. Concerted efforts should be directed to bring the standards of living in rural areas up to the levels in urban areas, in order to provide a rural non-farm alternative to rural farm out-migrants.

6. In the context of planning for future urbanization, it is most important to prepare urban areas to be able to accept new residents, and to prepare young and old alike in rural areas to be contributors to an urbanized society to which they will probably move, or eventually be surrounded by. For rural areas, this basically means training.

B. Manpower

Population trends underway in the rural areas of the country strongly influence the availability of manpower for rural and farm production activities. As noted above, birth rates are much higher in rural than in urban areas, while at the same time, there has been a strong migratory flow from rural to urban areas. Accordingly, during the early 1970s the rural population has continued to grow in absolute numbers and continued to account for more than half of the total population, although the rural proportion of the total population declined slightly from 56.5 percent in 1970 to 53.9 percent in 1976. In addition, however, since the migrants from the rural areas have tended to be in the 15-39 age bracket, this has resulted in a disproportionate share of the working age manpower becoming urban.

Rural and Farm Labor Forces

The total labor force in Syria has continued to grow from about 1.6 million to 2.0 million over the period 1970 to 1977. At the same time, as shown in the following tabulation, the size of the rural labor force

declined in relation to the total labor force from just over 60 percent during the 1972-75 period to about 54 percent in 1977.

Year	Total Labor Force (000)	Rural Labor Force (000)	Rural as Percent of Total Labor Force
1970	1,571	907	57.7
1971	1,646	958	58.2
1972	1,715	1,035	60.4
1973	1,689	1,038	61.5
1974	1,719	1,045	60.8
1975	1,839	1,131	61.5
1976	1,828	958	52.4
1977	1,995	1,081	54.2

1/ The erratic nature of the annual rural labor force numbers apparently arises in large part from technical difficulties encountered in data collection. Similarly, large year-to-year variations occur in data on the farm labor force, especially with regard to female workers (see the Human Resources Annex).

In general, the farm labor force also declined during the 1970-76 period, and it appears that this decline was at a greater rate than that of the rural labor force. Since reliability of data on female workers is uncertain, trends can better be observed using the more consistent data on males in the farm labor force (see footnote to tabulation above). In 1970, about 641,000 males were in the farm labor force, and this number declined to about 516,000 in 1976. Compared with the total labor force, males in the farm labor force declined rather steadily from about 41 percent in 1970 to about 28 percent in 1976.

These data also suggest that while the number engaged in farming declined considerably over this period, the participation of rural people in non-farm occupations increased substantially either through growth in number of jobs in the rural sector or through larger numbers commuting to work in the urban sector.

Also, comparisons of the proportions of various age groups in the farm labor force compared to the non-farm work force indicates a larger proportion of workers under age 20 and over age 60 in the farm work force.

Labor Requirements

An attempt was made to determine labor requirements for farming by Mohafaza and by month using 22 major crops. Even omitting some small acreages and minor crops, the 22 selected crops occupied 97 percent of the land area in crops in the 13 Mohafazats. Labor requirements for the various field operations were obtained from the Ministry of Agriculture.

Three crops -- wheat, olives and cotton -- seem to have accounted for over one-half of the total requirements for the 22 crops. The following data shows the labor requirement in man hours per Hectare for some of the major crops:

-- Wheat (Irrigated): Least mechanized, 425; Partially mechanized, 202; and Most mechanized, 77.

-- Barley (Non-Irrigated): Least mechanized, 321; Partially mechanized, 145; and Most mechanized, 25.

-- Cotton (Irrigated): 547.

-- Olives: 528.

-- Sugar Beets (Irrigated): Average, 562; Fully mechanized, 75.

-- Potatoes (Irrigated): 696.

-- Tomatoes: 796.

-- Tobacco (Non-Irrigated): 1,808; Fully mechanized 575.

Crops using the most total labor in millions of man-days for 1977 rate in this order: Olives -- 14.4; cotton -- 12.3; wheat -- 11.1; barley -- 5.8; watermelons -- 4.0; lentils -- 3.2; tobacco -- 3.1; and grapes -- 3.1. Total man-days for the 22 crops was 69.4 million. The man-days required for livestock production and on acreage omitted was estimated at a total of 20.4 million, for a total of 89.8 million man-days for all crops and livestock.

There were considerable differences among Mohafazats in the relationship of farm labor force and the apparent monthly labor requirements as indicated by the following tabulation from 1977 data:

Average Monthly Numbers of Workers

<u>Mohafazats</u>	<u>Required</u>	<u>As Percent of Farm Labor Force</u>
Tartous	23,434	75.1
Homs	21,775	50.9
Aleppo	61,131	62.6
Deir-ez-Zor	23,805	52.2
Hassakeh	32,586	51.2
Dar'a	8,724	51.8
Lattakia	19,976	45.1
Quneitra	820	32.7
Sweida	8,266	76.4
Damascus	18,711	45.0
Idleb	37,129	76.9
Hama	30,970	18.6
Rakka	20,439	44.8
TOTAL	307,762	53.2

It appears that, in spite of regional and seasonal labor shortages, there is still a considerable amount of underemployment from the viewpoint of the number of days worked by each individual throughout the year.

There is serious concern about labor shortages for three crops--sugar beets, cotton and olives -- particularly for harvesting, but the available data indicate that the most serious labor shortage is during the grain harvest for a few Mohafazat. The data also indicate that the decrease in the farm labor force is tied to the relative increase in the off-farm wage rates. Mohafazats where the percentage increase in wage rates were rising most rapidly in the 1970-76 period were also those in which the most rapid decrease in the percentage in the farm labor force took place.

Training Needs

As indicated by population projections, if recent employment rates are to be maintained, the absolute number of employed must be more than doubled by 1990, and the future growth in those available for employment will be primarily among persons from ages 20 to 34. While this age group accounted for about 36 percent of employed person in 1970, the projections suggest it will account for about 43 percent of the available labor force by 1990.

These data on the total labor force give a clear indication of the future investment requirements for educating and providing training for tremendous numbers of entrants to the future labor force. The job of training the rural labor force, although less formidable, is still very large.

Indeed, using 1976 labor force participation rates of the work force, it would appear that the rural labor force could reach 1,181,000 by 1981 for an increase of 23 percent, and by 1986 it could have a further increase of 308,000 for another 25 percent over 1981.

Many farming operations, particularly hand labor, do not require a great deal of skill, at least beyond that gained by experience and on-the-job training in a relatively short period of time. However, where machinery and equipment is concerned, somewhat greater skills are required to adjust to run them.

Proper training in the use of insecticides, herbicides, and fungicides is extremely essential, and must be used properly for safety of the user and the consumer of the products being sprayed.

Literacy Level

The problem of training is complicated by the fact that only one-third of the agricultural labor force was reported literate in 1970. And, the proportion varied greatly from 18 percent in Al-Hassakeh and Al-Rakka to 56 percent in Sweida. About two-thirds of the farm managers were reported to be literate.

As might be expected, there was a large difference in literacy between sexes and while data is not available on the literacy level of farm workers, the data on total labor force show females are making more rapid progress than the males.

For example, in 1970, 54.7 percent of the males in the total labor force were literate compared to 21.5 percent for the females. By 1976, 67.9 percent of the males were literate compared to 51.4 percent for the females. While male literacy in the total labor force was improving 13 percent, the score for females went up 30 percent -- from a much lower base point.

If the farm labor force had made the same literacy progress as the total labor force, their literacy level should have been about 50 percent by 1976 and above that by now. (Human Resources Annex).

While the training task is gigantic, the following institutions and organizations would appear to be obvious participants: Extension Service, cooperatives, Peasant Union, and the vocational-type schools as well as commodity organizations such as cotton and tobacco.

Manpower Planning

Various alternative and/or complementary policies could be considered in planning manpower supply and needs for the future. These can be divided into short-range policies dealing with the problems of underemployment and labor shortages during the year and among Mohafazats, and long-range policies relating to farm labor productivity and earnings of farm people.

Short-Range: Reduce Seasonal Variation

Reduction in peak seasonal needs can be attempted with different crop combinations, but probably would result in poorer use of land resources.

An obvious policy to reduce season peaks is the increased use of herbicides and the use of more machinery and equipment. Labor requirements for hoeing and weeding are very high. The Ministry of Labor calculates savings of about SL4 per ha. for the use of herbicides rather than hand weeding of wheat. Given the almost 2 million ha. of wheat and barley, if all were treated with herbicides, it would be a direct savings of SL2 million and at least 1 million man-days of labor.

Since harvesting is also a major user for farm labor, the introduction of more grain combines, cotton pickers and sugar beet machinery would help cut this peak demand for labor.

A more effective and efficient distribution of farm labor available for seasonal peaks is possible. The activities of existing employment agencies could be expanded to include placement of farm workers on a short-term basis. At present, employment services do not register either employers or potential farm workers. Also, a separate government agency operating on a national scale could facilitate the recruitment and redistribution of farm laborers who could travel from one region to another. The Peasant's Union might be in a position to handle this approach.

The use of students and other non-farm labor is another alternative to help meet seasonal peaks in demand.

Long-Range: Increase Labor Productivity

Two key long-range labor-saving technologies are (1) first and most obvious, replace people with mechanical power and equipment; and (2) increase production per land or animal unit.

It appears that when tractors are first introduced they are used only for a few tasks, especially plowing, but not extensively for cultivation and harvesting. More extensive use will speed up mechanization and use less labor than using horses and oxen. However, since the farmer may not have an opportunity to work off the farm for pay he may be financially ahead to stay with animal power.

Getting an increase in crop yields may not be easy, but use of improved seed, increased application of fertilizer, better rotations or other procedures that increase yield per hectare will also increase the productivity of labor.

The potential for increasing production per livestock unit is often greater than for crop production and applies to farms of all sizes. For example, Syria's cows averaged only 1,147 kg of milk in 1977, while double that would be a modest goal and greatly increase the productivity of labor; also, increased milk production per cow would make more efficient use of scarce roughage since fewer cows would produce more milk.

Conclusions

1. Future planning for utilization of labor would benefit if more information were available on the farm labor situation. Crop labor requirement data generated by the Farm Survey, taken together with numbers of individuals available for farm work within the villages, could be used to make a more accurate and detailed analysis of underemployment and labor shortages on a smaller geographical basis than was done in this study. Moreover, such information could be collected on a continuing basis in order to provide current information.

2. The analysis of the Farm Survey data could attempt to identify the approximate farm size for various types of farming systems consistent with stated government income and equity policies and goals. Appropriate size of farm crop and livestock combinations should be defined for each RPU.

3. If the number of farm workers is to decrease while the rural population increases, more workers must seek work elsewhere, either in urban employment or non-farm rural employment. Furthermore, if it is a goal to slow down growth of urban areas, then it is imperative to give priority to the development of non-farm rural employment possibilities.

4. When farmers substitute or add inputs produced off the farm such as farm chemicals, machinery, etc., non-farm employment will increase.

5. While the 1970 census reports 82,000 persons in occupations that process or market mostly agricultural products, there seems to be no available estimates of growth of the farm input industry in Syria. It appears research on this would be of use in development planning.

6. It would seem that the system of share renting would tend to force an increase in mechanization. For example, with machine harvesting (combining), 14 percent of the crop share went to the individual who harvests or pays for the harvesting; while, hand harvesting gave 28 percent of the crop to the person harvesting by hand. Research should attempt to describe and analyze these relationships.

7. If it is found desirable to continue hand labor in cotton and sugar beet production, there should be study of the need to bring workers in from beyond daily commuting distances. If this developed, regulations on housing, sanitation and health would need to be examined.

8. Literacy levels in the rural areas are quite low and vocational skills inadequate, indicating a need for studies related to training the farm labor force.

9. It is recommended that the manpower planners hire a woman who is cognizant of both the cultural social setting of Syria and is well informed about the changing role of women in other societies to study the situation and develop proposals to bring farm women into the main stream of economic life in Syria.

C. Levels of Rural Living

Since independence, and particularly after 1963, the Syrian government has actively sought to spread social services to its rural citizens. The goal is to reduce the differences between Mohafazats, and between the city and the countryside within the same Mohafazat, as to the economic and social standing of citizens.

Along with concern for equity, dispersion of basic services is considered essential for achieving several broad policy aims. These merge into a general desire to avoid the type of polarized development common in most developing countries--the overwhelming concentration of industry and services in one or two urban centers while stagnation and out-migration come to characterize the rest of the country. At its presently high levels, such migration is thought to be dysfunctional; it depletes the agricultural labor force of its most productive members and thus aggravates further what is already considered to be a serious agricultural labor shortage in several areas of the country.

In addition to concern over migration, support for policies to raise the skill, health and nutrition levels of the rural population and to more equitably distribute productive factors--mainly land--comes from the conviction that measures such as these enhance productivity. Accordingly, major Syrian rural development efforts--the agrarian reform and the Ghab and Euphrates River Basin Development Projects--combine either land redistribution and/or physical resettlement activities with the promotion of health, education, literacy and rural industry and handicraft programs.

Problems in Delivery of Social Services

Although the delivery of social and physical services faces some common problems, greater difficulties are often encountered in planning for the delivery of social services as compared to physical ones. Because of their high infrastructural costs and regional complexity, programs to provide potable water, electricity or roads are usually Government initiated and financed and are highly visible; moreover, they require only a relatively passive stance by beneficiaries. Other physical service delivery, of agricultural production inputs, for example, is typically broken down into units deliverable to sub-groups of the population such as farmers and is provided by commercially oriented agencies, such as the Agricultural Cooperative Bank, cooperatives or private companies.

In contrast, social services, health and education in particular, lack these features. A school or health clinic is usually not an impressive engineering achievement. The schools and clinics are, at the same time, viewed by the State as of fundamental importance to the development of human resources and are for this reason subsidized and not commercially run. The problems of social service delivery for the State combine with widely varying patterns of human settlement--some highly centralized, others widely scattered--to produce special challenges for the design of such systems.

Among the factors that can limit service utilization, the problems of physical access are the most obvious ones, including the distance a person has to travel to get the service as well as the quality of transportation (both direct and indirect). Eliminating or even minimizing these barriers to access throughout the country is problematic given the existence of 6,308 villages and an even greater number of sub-village units or mezz'aa, some 7,700.

Fragmentation of settlement is especially severe in certain areas of the country, particularly in those characterized by arid or semi-arid conditions (for example, Al-Rakka and Deir-ez-zor). In Al-Hasakeh, even though the ratio of mezz'aa to villages is small, the number of mezz'aa is very large. Even greater difficulties are encountered in trying to extend services to semi-or completely nomadic Bedouin groups in the Steppe.

Some efforts have been made to alter existing settlement patterns by encouraging relocation of people from small to larger rural settlements or central villages. Such relocation is being attempted in some of the reclaimed areas of the Euphrates River Basin with 15 planned communities as central villages. A combination of positive and negative inducements (denial of services, restriction of pasture lands, etc.) has also been used to encourage Bedouin sedentarization. But on a nationwide basis, such relocation initiatives can only be expected to have a limited short-run impact on the problems of reducing access difficulties deriving from fragmented settlement patterns.

Syria's six Rural Development Centers (RDC) represent a variant of the central village approach, the main idea being to concentrate essential services in one location to meet the needs of between 40-50,000 people in the surrounding area. These multi-service centers provide agricultural extension, health care, literacy and rural industries.

Education and Health Delivery

Responsibility for providing any given service is divided sometime by function, sometimes by clientele, and most often by a combination of both.

Ministries responsible for formal education include the Ministries of Education, Higher Education, Industry, Agriculture and Commerce. Responsibility for adult education, training and literacy is dispersed to an even greater extent. For example, in 1977, the Peasant's Union alone conducted 682 literacy classes with 11,675 participants. The Ministry of Labor and Social Affairs conducts literacy classes in villages served by its six RDCs. And, 37 courses with 780 participants were provided by GADEB in 1977.

The Ministry of Education has been active in extending nutrition and health services to school children, particularly those in rural areas. Last year a supplementary school nutrition program was initiated on a limited basis in nine villages in Duma and Damascus. The program will be extended in stages to cover all Mohafazat and 200,000 children by 1985. Daily rations of condensed milk (78 grams) and peanuts (50 grams) are provided to each child, a mix adopted from a similar program in Saudi Arabia. Teachers accompany distribution of the food with short talks on aspects of health and nutrition. Participating international organizations include UNICEF, FAO and WHO. The Ministry of Education and the State Planning Commission are charged with execution and planning, while the Ministry of Internal and Local Affairs determine where to set up these programs.

There is also a proposed program to build 50 school dispensaries by 1980 with a target of 1 dispensary per 5,000 students. Each is to have a doctor and a medical assistant with a dentist available for every 2 dispensaries.

As a response to the confusion and duplication created by the large number of authorities typically involved in the provision of health, education and other services, a series of inter-ministerial coordinating committees has been established--including those for Agriculture, Health, Planning and the Eradication of Illiteracy, among others. Also noteworthy has been an ever-increasing role of organizations like the Peasant's Union and the Women's Federation in activities having to do with the provision of services to rural areas. They have acquired representation on the Higher Council and similar coordinating and planning bodies on the mohafaza and mantika levels. The Peasant's Union has gained an especially influential position, being involved on such basic questions as the location of health and educational facilities as well as being more directly involved in the provision of training and other activities.

The cooperative framework into which land reform beneficiaries were organized was merged in 1974 with the Peasant's Union. Cooperatives and co-op members were thereby linked into a national organization centered in Damascus and with offices in each province. By 1976, the PU represented 3,287 cooperatives, covering about one-half of Syrian villages, and had a membership of 236,269. Of the 103 communities in the Village Survey conducted in 1979, 66 percent were affiliated with cooperatives, 80 percent being multipurpose co-ops. However, only 22 had a functioning cooperatives office in the village.

Education: Pattern of Growth

In education, expansion has been greatest at the secondary level: intermediate and general secondary school teachers increased almost fivefold from 5,503 in 1963 to 28,606 in 1977. Primary school teachers rose from 15,607 to 40,218 over the same period (an increase of 158 percent) while the number of secondary level vocational/technical school instructors increased 212.4 percent.

In the case of primary schools, which have the highest student-teacher ratio, enrollment increases at 110.2 percent nearly kept pace with teacher growth. Growth in the number of intermediate and general secondary students, 321 percent, was about three-fifths of the teacher expansion rate, and in the case of secondary technical schools student increase of 124.3 percent were only about one-half of teacher expansion.

Despite numerical increases, disparities in educational opportunity by region, by sex and between rural and urban areas persist. Girls from rural areas of the least urbanized Mohafazats, are worst off. It has

been reported that enrollment of girls at primary and lower secondary levels vary from as low as 8 percent and 2 percent of total enrollments in rural Deir-ez-zor to 49 percent and 44 percent in Damascus City. Respective national averages were 39 and 31 percent.

In spite of these favorable developments regarding education, many rural people still do not have ready access to schools as indicated by the following tabulations.

<u>Mohafazats</u>	<u>Percent of Villages Without a School</u>	<u>Average Village Population</u>
Damascus	6.7	2,579
Aleppo	12.7	494
Homs	12.8	725
Hama	no information	855
Lattakia	16.4	541
Deir-ez-zor	19.2	1,812
Idleb	5.9	822
Al-Hassakeh	47.6	262
Al-Rakka	3.6	892
Sweida	3.9	976
Dar'a	0.0	2,173
Tartous	20.9	560
Quneitra	no information	122

The Mohafazats in which the proportion of villages without schools is high (more than 10 percent) are generally characterized by settlements of small average size (those with up to 800 residents). Deir-ez-zor is an exception. Similarly, again with the exception of Deir-ez-zor, in all Mohafazats with larger villages (more than 800 residents), more than 90 percent of the villages have schools. The most extreme negative case is Al-Hasakeh: 47.6 percent of its village are without any school facilities and the average village size is the smallest of all Mohafazats (except Quneitra) -- 262 residents.

Health: Pattern of Growth

Health services, like education, have undergone tremendous expansion since 1963. Growth has not, however, sufficiently reduced the maldistribution of health personnel and facilities which has continued to favor urban areas, especially the largest ones--Damascus and Aleppo.

Doctors, the keystone of the health delivery structure, are free agents and, except for two years of compulsory rural service upon graduation, are able to set up practices wherever they desire. As shown in the tabulation below, their collective preference is clearly to practice in Damascus or Aleppo. Approximately three-fourths of doctors in Syria congregated in these two Mohafazats in 1977, and half of the nation's doctors live in Damascus and Aleppo Cities.

<u>Mohafaza/Region</u>	<u>Number of Patients per Doctor</u>		
	<u>1963</u>	<u>1971</u>	<u>1977</u>
Damascus ^a	2,541	1,726	1,250 ^d
Aleppo ^a	6,239	4,996	2,941
Homs	8,891	4,235	3,264
Hama	8,911	8,167	3,843
Lattakia ^b	8,678	6,844	4,238
Deir-ez-zor	11,124	5,322	5,238
Al-Hasakeh	7,425	10,432	7,712
Sweida ^c	22,091	11,577	7,909
Dar'a ^c	15,074	8,971	8,024
SYRIA	5,494	3,788	2,515

^a Includes Idleb and Al-Rakka; ^b includes Tartous; ^c includes Quneitra;

^d in Damascus City, 973 patients per doctor.

Given the overwhelming urban concentration of doctors, progress indicated by a steady reduction in the population-to-doctor ratio in all areas of the country since 1963 probably failed to benefit rural residence to the extent that one might otherwise have expected. However, the overall progress since 1963 in reducing the differences among Mohafazats, rural and urban, is noteworthy. The range in patient-doctor ratios is from 1,250 in the Damascus Mohafazat to 7,909 in Sweida in 1977, whereas in 1963 the ratios were 2,541 and 22,091, respectively. Since 1971 less spectacular improvements have been achieved, although the general trend toward lowering the patient-doctor ratios has continued. Some areas of the country have been improving less than others and also still have the highest ratios, namely, Deir-ez-zor, Dar'a and Quneitra, Sweida and Al-Hasakeh. Al-Hasakeh had a higher ratio in 1977 than in 1963. All of these areas are still highly rural and would seem to require special rural health program to get more doctors working among the rural villages.

There are obvious difficulties in getting more doctors to rural areas. Facilities in outlying areas have had to rely mostly on fresh medical school graduates performing their compulsory two-year obligation. Personnel recruitment and retention remain serious problems outside the major cities

The State has greater authority over the location of hospitals and clinics than its doctors and these are consequently more evenly distributed. However, even here the picture is one of urban concentration. Two-thirds of all hospitals with 77.7 cent of all beds are located in Mohafazat centers.

For people living in the countryside, health clinics are the facility with which they are most likely to come into contact. Compared to hospitals, the 300 health clinics are much more evenly spread out and are found in mantika, nahia centers and large villages. A possible reflection of this fact is that 69 percent of the 103 communities represented in the Village Survey are 20 km. or less from the nearest clinic as the tabulation shows.

<u>Kilometers to Neareast Clinic</u>	<u>Percent of Villages</u>	<u>Kilometers to Nearest Clinic</u>	<u>Percent of Villages</u>
0	4.9	21-30	12.7
1-5	15.7	31-40	5.9
16-10	18.6	41-50	2.9
11-20	29.4	50+	9.8

Rural Development Centers

Six Development Centers (RDCs) now exist in Syria with a seventh being built at Al-Hasakeh. The other six are located at: Damascus, Aleppo, Lattakia, Deir-ez-zor, Dar'a, and Sweida. Introduced into Syria in 1959, this number is substantially less than the original goal of at least one center in each Mohafaza.

Each center consists of four units: A health unit, an agricultural unit, a social unit, and a construction unit. The construction units are now inactive.

The health units are mainly geared to provide outpatient care, particularly for maternity and early childhood cases. Units have 15 beds primarily used for natal and postnatal care. Medicines prescribed are free.

The problem of coordinating the RDC's health program with other ministries' health programs, and the shortage of funds to provide financial and other incentives necessary to hold doctors, is a continual problem. (Human Resources Annex).

The social and educational units offer literacy courses, establish nurseries, use bookmobiles to distribute reading materials to area villages, offer courses in sewing, knitting and cooking, and have a mobile film projection unit to show films in area villages.

Four of the RDCs have carpet-weaving units and two of those have rug-weaving facilities. Approximately 100 carpet units now are in operation in Syria.

The agricultural units serve in an Extension capacity and use demonstrations plots, prepare and disseminate educational materials, distribute fruit trees and olive saplings, conduct field tests for new crops, arrange herbicide and pesticide applications, and provide veterinary services.

Conclusions

1. A large gap still exists between the social services being delivered to rural areas as compared to urban areas although much progress appears to have been made in reducing this inequity in recent years. Planned programs for expanding rural services will narrow the gap even more. A series of inter-ministerial coordinating committees has been established that should reduce or avoid some of the past confusion and duplication in supplying services.

2. The unique potential of the Rural Development Center (RDC) idea lies mainly in the fact that such centers physically and administratively bring together a mix of disparate rural development related programs and services. Coordination difficulties weaken this potentially integrating feature, but other experience indicate that there are ways to reduce such problems. Their greatest contribution, however, might be to provide a forum at the local level where information can be shared among people involved in health, literacy, agricultural extension and handicraft activities. Literacy could reinforce health, education, and agricultural extension activities by introducing information from these areas into the reading material prepared for courses. Agricultural extension agents working within an RDC structure could be made more aware of the varied problems facing farmers and other rural people. Experience gained could be introduced into staff training for technicians and other working in rural areas, whether within or outside the framework of the RDCs.

3. The potential of using the 53 relatively homogenous agro-ecological zones (RPU's) or some regional combination of these zones for social service planning should be further explored. For instance, agro-ecological conditions such as availability and source of water, topography and soil quality impinge on virtually every aspect of social service planning, affect settlement patterns, and help determine the types of problems with which social service delivery systems have to contend.

D. Rural Change

Life in rural villages is in a continual process of change and development. In addition to the effects on rural life, these changes directly affect the use of natural resources, as well as manpower, in the production of agricultural commodities.

Tendencies for Change in Villages

Case studies of several rural villages indicate the following far-reaching changes which are unfolding and which are significantly affecting village life: (1) Money, in place of barter, has become the clearly dominant medium of exchange; (2) New bases of social differentiation are evolving; (3) Labor is taking advantage of non-farm employment alternatives and thereby creating the appearance of a labor shortage in agriculture; and (4) Mechanization of agriculture production is advancing.

Monetarization of Social Relations

Money has become the medium for exchange in most aspects of village life. In previous times, for example, labor exchanges were a prevalent form of accomplishing harvest. Today, most of the harvest is done with hired labor. The household previously was an autonomous unit, but today grows little of its needs, and is dependent on the purchase of food supplies in the village market, the town market and the food card.

What this observation signals is that family decision makers attempt to maximize cash income. This doesn't imply that none of the products produced on the farm are consumed on the farm, but that this is now less important than it was in the past. The importance of a maximizing cash income strategy upon the diffusion of new agricultural technology is that alternative income sources outside of agriculture are very salient.

Thus, if a new technology involves a greater management and labor input, farmers evaluate it in terms of how much cash income the new technology might produce versus income that might be earned from working in Saudi Arabia, Turkey, Jordan, Venezuela, Argentina, United States or in construction, livestock projects or olive harvest in Syria. Increased yields brought about by new technology or crops are attractive only if the presumed price for the commodity would produce a higher family income than working off-the-farm.

In the village studies, only one area in one community was found where most family labor is held at home producing cotton, sugar beets and vegetables because the villagers are convinced they can make higher cash incomes from farm production than from alternate employment. This higher income from farming stems from the high soil fertility and available water in the community and a high demand for vegetables in nearby urban areas. Also, recent increase in sugar beet prices and the close location of a sugar beet factory make this an attractive income producer. In all other villages, men were absent for long periods working off the farm and most agricultural labor was performed by women and children.

New Bases for Social Differentiation

Increased family income from off-farm employment seek new sources for investment. Almost invariably, the increased income is first directed toward improving the home, then towards educating sons, buying more land, or opening a new business. Thus, new bases for increasing the gap between high and low income groups within agriculture are present. The sons who can enter the university generally attain higher paying off-farm jobs. Many move from the local village and begin to manage farms from a distance, a process which may seriously affect future agricultural productivity.

One of the most striking aspects of rural villages is the tremendous amount of construction that is taking place and the high demand for improved services which centers around electrification and potable water.

The extent of these changes is illustrated in Mansourah, one of the villages studied in detail. In 1975, this village, 20 km. from Rakka on the new road to Aleppo, had no electricity, potable water, schools or health center. Today it has electricity and potable water, a full-time health center with a doctor and two nurses and two new schools -- one primary and one middle school. Most sons and a few daughters now attend school.

The major change in agriculture has resulted from the digging of 80 irrigation wells in the lower steppes. Each well will irrigate 5 to 7 hectares allowing the development of approximately 500 hectares to increase family income. The average annual family income was SL 8525 in 1975 -- SL 13,000 in 1979. The number of tractors increased from 0 to 10 during the four years, with heavy demand for plowing, planting, and cultivating.

Appearance of a Labor Shortage

The movement of labor power in and out of the SAR and between sectors of the SAR is essentially a male phenomenon. For many tasks, most agricultural labor is performed by women and children. This explains why some practices in agriculture persist because the male decision-maker is away. For example, pulling wheat at harvest time on dry, sandy soils is not a reflection of any hard custom or resistance to mechanization, but because it is easier for women to pull wheat than to cut it with a sickle. And since tractor driving is a male job and is male supervised, it is only done when the men are in the village.

There is no absolute labor shortage in terms of low population numbers or a low growth rate. The labor shortage in agriculture is a consequence of not being able to keep the available labor power full time on the farm or even in the country.

This phenomenon is illustrated in another village studied. Jerjer is a village of 85 farming households located in the Aleppo Mohafazat with about 10,000 head of livestock. The principal farming activities are production of livestock, barley and wheat, with some lentils and watermelon.

Seedbed preparation is performed by tractor either with the cooperative tractor or the rental of one of the eight private tractors. Harvesting is done with a sickle, since plots are fragmented, and the women and children do the threshing. The size of land holdings in the village vary from 2 to 45 hectares with the average about 8 hectares.

Most men leave the village for outside work, especially during the summer. Sources of employment in the village are stone cutting at 1,000 SL. per month and house construction at 800 SL. per month. However, many adult males go to Saudi Arabia, some returning in September to pick up their families and engage in the olive harvest until planting time for wheat and barley. Thus, for about 5 months of the year, the village is almost void of adult males.

Mechanization

When a labor shortage psychology gets built into a plan, it is easy to jump to mechanization as a solution. However, some observations should be made here. Mechanization has proceeded rather rapidly in the villages studied. Most seedbed preparation (ploughing and disking) is now done by tractor in those areas where farm size and terrain permit mechanization. People don't really prefer to hand cultivate; they would prefer to reduce the drudgery of farm work. However, for further mechanization to be profitable it would require a change in irrigation practices and the land holding pattern. Land holdings are extremely fragmented in the SAR and any reconsolidation of them will be highly resisted. This tenure pattern is the single biggest obstacle to further mechanization.

Changes in Control Over Resources

Two critical natural resources in agriculture in the SAR are land and water. Since 1946, the struggle over the control of these resources largely defines the recent historical development pattern of Syria. Since the rise to power of the Ba'th Party in 1963, significant changes have occurred in control over land and water resources and on the peasants' role in Syrian development.

Traditional Land Tenure Patterns

The traditional land tenure patterns in the SAR are a complex set of property relations that involve a mixture of classical feudal grants (Zameh holdings) and freeholder rights that emerged as the feudal social organization began to break down. The Zameh holdings followed traditional feudal arrangements wherein a lord was given land grants and peasants performed direct labor on the land. In return for his labor, the peasant received small plots of land for family subsistence, usually located in different ecological niches so that a full range of subsistence needs could be fulfilled. This involved some irrigated lands, some pasture lands and some dryland cropping lands.

In addition to Zameh holdings, three types of freeholdings existed. The first type of holdings were large private holdings built up by purchase from villagers in times of distress. Small private holdings or freeholdings, existed under Mulk or Emir ownership. Mulk ownership allowed both usufruct rights as well as the right to the soil; i.e., it could be sold. Emiri holdings provided only usufruct with the soil rights being reserved by the State. Finally, there were Amlak Ame on State domain lands. Prior to the agrarian reform, State domain lands

were held in trust for common use by the community. In addition to State domain lands, there are Wakf lands which are held by religious or charitable persons. Wakf lands are not covered by government audit which makes it difficult to judge the extent of holdings or how they are exploited.

Semi-nomadic groups in the steppe also marked out territorial claims that were maintained via kinship alliances to form larger cooperative groups that increased territorial claims.

According to Albos (Land and Agrarian Reform in Syria, Damascus 1962, p. 38), land holdings in 1952 were distributed as follows:

<u>Size of Holding</u>	<u>Percent of Total Area</u>
Less than 1 hectare	1
1-5 hectares	5
6-10 hectares	7
11-25 ha.	17
26-50 ha.	11
51-100 ha.	10
101-500 ha.	24
501-1000 ha.	9
over 1000 ha.	<u>16</u>
	100

About 10 percent of all holders controlled about 50 percent of the land. In addition to the concentration of land ownership, these same large land owners largely controlled access to water and access to the market. The peasant movement to break this form of exploitation provided one of the major social forces for the Ba'th Party and its control of the State since 1963. Most of the lands held in the 100 and above hectare category have been expropriated.

Agrarian Reform

While agrarian reform began in 1958 when Syria was still united with Egypt, the most significant reform began in 1963. One of the major steps in Decree No. of 1963 was to set ceilings on land ownership.

These ceilings were as follows:

A. Irrigated Lands:

- 15 ha in the Ghouta
- 20 ha in the Mediterranean coastal area
- 25 ha in Btiha area and its surroundings
- 40 ha in irrigated areas with pumps
- 50 ha in irrigated areas with pumps or any other lifting devices (i.e., the Euphrates, Tigris, Khabur)
- 55 ha in irrigated areas from wells (i.e., Hasakeh, Rakka and Deir-ez-zor Mohafazat in the northeast part of Syria)
- 45 ha in the remaining areas where irrigation is done via pumps or other lifting devices.

B. Rainfed Lands Planted in Olives and Pistachio for More Than Ten Years:

- 35 ha in the Lattakia Mohafaza
- 40 ha in the remaining mohafaza with olives and pistachio.

C. Rainfed Areas

- 80 ha in the areas where the annual average rainfall exceeds 500 mm.
- 120 ha in the areas where the range of rainfall is 350-500 mm.
- 200 ha in the areas where the rainfall is less than 250 mm.
- 300 ha in the Mohafazat of Al-Hasakeh, Al-Rakka and Deir-ez-zor.

The intent of the law was to make an equitable distribution of the land based on economic value, the nature of crops and agro-climatic conditions. The law explicitly stated that the compensation paid to owners for their expropriated lands was to be ten times the average rent for the previous period. This amount was to be amortized in a forty year period (item 10 of the Land Reform Law of 1961) and an interest paid on the unpaid principal of 1.5%.

A total of 1,401,300 hectares were expropriated of which 254,000 ha. have been allocated to cooperatives and Ministries and 466,100 ha. have been distributed to individual holders. Some 329,800 ha. were sold and 351,400 were still not distributed by 1975.

For the SAR as a whole, 76 percent of land is cultivated privately. The largest concentration of private holding occurs in Al-Rakka, Al-Hasakeh, Lattakia, Hama and Aleppo. In 1970, the bulk of land holders (93.64%) have land holdings of 30 ha. or less. Indeed, 50 percent of all holders have access to less than 5 ha. of land.

The reform reduced the preponderance of large holdings (more than 100 ha.) from 49 percent of the land area to around 10 percent. All holdings categories smaller than 50 ha. experienced some increase. The total "less than 5 ha." categories doubled in the importance, which signals the problem of land fragmentation, which occurred during this same period. Thus, it seems clear that the agrarian reform has effectively produced a large number of land holders with relatively small plots of land.

Fragmentation

One of the most severe problems affecting changes in farming techniques and increased productivity is the small size of holdings and the fragmentation of even these small holdings into many parcels. For example, 72 percent of all holders have an average 3.16 ha. of land divided into four plots. It is possible to encounter holders of two ha. of land made up of 10 or more non-contiguous plots. These extremely small plots and basic irrigation techniques effectively prevent the use of most harvest mechanization techniques. Rental arrangements exist that contribute to land consolidation. Nevertheless, land fragmentation under private holdings patterns are the greatest single obstacle to further mechanization and to the use of most technologies which require large, contiguous holdings.

Further information on land tenure and the organization of farming in The Euphrates Basin is given in The Human Resources Annex.

Technological Changes in Syrian Agriculture

The rate of technological changes in Syrian agriculture has been rapid throughout the 1970s. Over 3,000 new tractors are sold each year. Fertilizer use has increased by more than 100,000 tons since 1970.

The SARG has established a number of state agencies to produce and diffuse new technology to agricultural producers. These include (1) the Seed Improvement Program, (2) Experimental Farms, (3) Extension Services, (4) the Peasant Union, (5) the Tractor Plant, and (6) the licensing program for agricultural production.

The licensing program, in effect, shifts some of the decision making on new technology away from the individual farmer to the national planning process. Nevertheless, private producers still make the critical decision whether or not to license their production.

Some of the problems encountered in bringing about technological changes are illustrated by the response of farmers in one of the case study areas detailing why they were not switching from cotton to sugar beets as they were being urged to do. The deterrents include:

1. Almost a total lack of sufficient knowledge about producing sugar beets with the various soil and water conditions in Syria.
2. Serious labor shortage relative to the requirements of beets.
3. Lack of an adequate seeder to plant monogerm seed at a sufficient rate to assure the optimal number of plants per hectare.
4. Small plot size and basin irrigation which require hand labor to thin, weed and harvest thus limiting mechanization of sugar beet production on non-state land (i.e. cooperatives).
5. Little or no information available to producers about the best plowing depth, timing and amount of irrigation, best planting time to get maximum sugar content as required at harvest time, or optimal amount of fertilizer to assure maximum yields.

Conclusions

1. The social relations of village life are becoming monetized. Thus, the maximization of family cash income is the key decision-making criterion determining the use of family labor.
2. In many areas, most agricultural labor is provided by women and children, with adult men working off-the-farm for a substantial part of the year.
3. There are a wide range of alternative sources of income for many rural residents both inside and outside of Syria.
4. Working off-the-farm for a high cash income is sometimes preferred to increased agricultural productivity. This creates labor scarcity in agriculture during certain times of the year.
5. Mechanization could reduce the demand for labor in agriculture, but it cannot proceed further without changing land holding patterns and finding an alternative to small plots with basin irrigation.
6. There is still effective rural resistance to producer cooperatives and State farms. As long as workers have employment alternatives, labor recruitment for State farms will be difficult.
7. More and earlier participation of producers in the formation of production goals could be encouraged. Instead of allowing producers to react to the plan, allow them to participate in establishing overall production goals and plans on how to attain them.

8. The national production needs should still determine the parameters of the plan and producers should be assisted in developing a clearer understanding of national and international constraints on the planning process.

9. A larger proportion of labor could be retained in agriculture by increasing wage and other incentives on State Farms, and by increasing prices for agricultural commodities insofar as this does not critically increase the urban consumer's food bill.

10. It should be recognized that rural producers do not resist mechanization per se, but do resist a change in land holding patterns which effectively limit the mechanization of harvest.

E. Nutrition

It appears that total food supplies are adequate in Syria today, but there is no accurate data relative to the distribution of nutrients among the various segments of the total population. Although a Household Consumption Survey was conducted by CBS in 1971-72 it did not provide information on nutrient consumption. Similar inadequacies exist in other available data. Hence, for this assessment, it has been necessary to depend upon information that could be drawn from the Food Balance Sheet for Syria.

Nutrient Consumption

The Food Balance Sheet for Syria has been prepared each three years since 1962. Estimates based on these data indicate that the average per capita consumption in 1978 provided 85 grams of protein and 2700 calories per person per day. The FAO recommended nutrient requirements are 71-75 grams of protein, and 2450-2500 calories per day for the Mideast countries of Syria, Lebanon and Jordan.

While this FBS information is valuable, a food balance sheet is not an estimate of the nutritional status of a population, and should not be used as such. A measure is lacking of how the average figures (85 g., 2700 cal. per capita per day) are distributed among the population of Syria.

Depending on the range of the distribution around the national average, we may find that as many as 10-20 percent of the population are consuming only 50 percent of their minimum daily requirement of protein.

No reliable and direct data could be found to estimate the distribution either for protein or calories. However, it is important to know the nature of the existing distribution because there are significant steps that could be taken to re-channel the distribution of nutrient among the members of the population in order to improve nutritional status. The most common types of intervention are policies and programs to change:

1. Wages rates and taxation to control distribution of income.
2. Price control on basic food commodities (bread, rice, oil, etc.) at the retail level.
3. Access to free or inexpensive public transportation.
4. Access to marketing centers in rural areas for rural people, perhaps through mobile stores.

Measuring Nutritional Status

Nutrition status is usually measured by growth, and growth is most easily observed in children. Generally, in the nutrition assessment of countries, it is assumed that if children of the country exhibit standard or better growth, the adults of the country are also well nourished. This correlation has been tested in several countries and has been found to be valid except for pregnant and lactating mothers. The most commonly used standard is the growth of children as measured in studies made in Boston and Iowa, U.S.A.

For Syria, there is very little data on growth of children. One study by the Ministry of Health covered 630 children from the rural areas around Damascus. It was reported that after 6 months of age the rate of increase of mean weight of sampled children was not as rapid as the standard, and the weight of children 18 to 21 months of age equalled only 75 percent of the Boston mean weight of children of comparable age. By the 60th month (five years of age), the mean height of the 630 children reached its lowest relative level (88 percent of the Boston mean height at the age of five years), but by the end of the 71st month, the growth in height recovered to the level of 91 percent of the Boston mean height. This study suggests that the critical age of children is between 6 months and 2½ years.

In a study of malnourishment in 1974, 773 children under 5 years old from rural and urban Damascus were investigated. This study showed that over 50 percent of the children suffered some degree of protein malnourishment and the most critical period was between 7 months and 2 years of age.

In another study, it was shown that the iron intake of sampled children remained below the iron requirement during and after the critical period (6 months to $2\frac{1}{2}$ years), thus strongly suggesting a lack of protein from 6 to $2\frac{1}{2}$ years.

A health survey is being initiated in 1979. This survey designed during 1978 and currently (May 1979) in the pre-test stage, is an excellent beginning for a nutrition surveillance system. The survey includes the following:

1. Height and weight measurements of children 0-60 months of age.
2. Five regions of Syria to be covered on a sample basis: North (Idleb), South (Sweida), East (Hassakeh), West (Lattakia), Central (Homs). One Mohafaza is randomly selected from each region each time the survey is repeated in the region. Seasonal variation (four different seasons) in data collection will help in the testing of hypotheses concerning the causes of malnourishment and associated diseases.
3. Urban-rural variations are designed into the sampling procedure.
4. The survey has been designed as a continuous survey to be repeated at two-month intervals throughout the year.
5. The survey is at the household level of the community. This is a necessary condition for a nutrition surveillance system.

A preliminary tabulation of 250 pre-test questionnaires taken for the health survey in five mohafazat indicates that up to 20 percent of the children (ages 0-6) in these areas are not growing according to standard expectations. Although these data are only from a pre-test, they indicate a malnutrition problem exists.

Previously collected data from CBS indicate that the highest mortality rate for the country as a whole is for the young children. The cause of death were primarily diseases which the current theory classifies as nutrition-related diseases. Also, national morbidity data indicate a high incidence of nutrition-related diseases. The available data (morbidity and mortality) can be taken as a warning flag that when the results of the 1979 nutrition and health survey begin to be available, some areas of the country may well indicate a relatively serious malnourishment problem.

Nutrient Demand

Indications of future demands for nutrients can be seen in the projections that were made of agricultural commodity demand for the years 1985 and 2000, using 1975 as the base year. (See Chapter I of Volume 4 - Agricultural Marketing Annex.)

The commodity demand projections for the years between 1975 and 2000 indicate that the greatest per capita demand increase will be in meat (106 percent) and dairy and poultry products (98 percent). The per capita demand for wheat is expected to decline by approximately 17 percent from the year 1975 to the year 2000. For fruits and vegetables the increase in demand is around 30 percent while the increase for pulses will be around 5 percent. These commodity demand projections are based on the estimated increases in income and population for Syria. Also, it is assumed that the commodities are of unlimited availability.

In summary, if supplies are adequate to meet these demand projections, nutritional requirements on the average will continue to be met until the year 2000. But, this does not mean there is no nutritional problem. On the contrary, other data show that there is a nutritional problem now and it may get worse despite favorable supplies of foodstuff. Also, there is the possibility that the food supplies themselves may be less than the projected demand at current relative prices.

Future relative prices among the commodities are particularly pertinent to the nutritional problems. For example, in 1975, SL. 1 would purchase 143 grams of wheat protein or 14 grams of protein from meat -- a difference of 10:1. Today, 1979, SL. 1 will still purchase about 143 grams of wheat protein (at the subsidized price), but only 9 grams of protein from meat (lamb) -- a difference of 15:1. If the price ratio between cereals (and pulses) and meat rises to the levels of 10:1, 14:1, or 20:1, it will become progressively more difficult for people to include more meat in their diets as suggested by the projections.

Traditional Diets

The traditional diets based on easily available and nutritious foods have survived times of scarcity of food and are typically well balanced with low-cost nutrients, at least during times of environmental and political stability. Syrian traditional diets appear to have these same characteristics. However, as Syria develops its food processing industries, new processed foods will appear in the market. Women, who will then have jobs, will no longer have time to prepare the traditional foods, and these will tend to be replaced by processed foods with much higher costs for nutrients. More malnourishment will likely result.

Conclusions

1. Although, on the average, supplies of food exist to provide adequate diets, some evidence exists, especially the Ministry of Health Survey, that equal distribution of nutrients is not being achieved and that malnutrition is a serious problem. Clearly, many of the children surveyed are not growing as the average per capita consumption of nutrients would indicate and this suggests that some families are not consuming the average per capita nutrients.

2. Nutritional considerations should be explicitly introduced into the planning process. A pilot project should be launched which would be oriented directly to nutritional analysis which contributes to planning decisions.

3. Data-processing capability should be improved so that analysis time can be reduced from months to hours.

4. Food standards for purity should be set and a monitoring system be designed and implemented as a pilot operation for a small set of selected foods. Some types of food contamination are closely related to undernourishment such as irrigation with raw sewage.

5. The effect of prices, food subsidies, eating habits and food wastage on nutrient consumption should be analyzed. Also scientific methods should be evaluated for use in selecting diets for school lunch programs.

6. It is suggested that an analysis of the traditional foods be carried out to determine their cost per unit of nutrition, and that these be compared to the unit cost of nutrients in processed and packaged foods.

7. In order to provide a firmer basis for nutritional planning, studies should be made on the relationship between livestock production and the quality and quantity of nutrients available for consumption at the family level; the relationship between health and sanitation programs and undernourishment (or morbidity and mortality); and the relationship between food storage and preservation programs and nutrient availability for the citizens.

8. The SAR should consider developing an interdisciplinary team(s) to work on nutrition problems because more than one discipline is usually involved. Such teams could be attached to the Prime Minister's office or a State Planning organization. Involving universities and other institutes usually adds practical and useful input.

9. The SAR could undertake the design and implementation of a nutrition surveillance system which would monitor, for various areas of the country, the availability and distribution of nutrients as well as general health status.

F. Bedouins

Although Bedouins account for only about 7 percent of the total population of Syria, they are an important element in the Syrian economic and agricultural development.

-- Beouins produced an estimated 27 percent of the total value of animal and crop production in Syria in 1977.

-- Bedouins account for much of the sheep production in Syria and sheep make up 70-75 percent of all animal production.

-- Bedouins make up 26 percent of the population in Al-Rakka province where 59 percent of the land is used for pasture.

-- The growing sedentarization of Bedouin groups in recent years has increased the number of tribesmen who are involved in agricultural pursuits during some portion of the year.

Accordingly, particular attention was given to problems facing the nomadic and semi-nomadic people of the country.

Bedouins and National Development

Until recently, the Bedouins have tended to be a state within a state. They had their own tribal law, with their own chiefs and tribal courts, and they were exempted from military service and taxes. The tribe constituted an autonomous political entity which could wage war and organize raids or conclude peace with other tribes, thus presenting a real source of unrest and a continuous menace in the desert.

After independence, Syrian policy was ambiguous. On the one hand attempts were made to continue policies to sedentarize the nomads and turn them into agriculturalists. On the other hand, a policy that might be described as separatism was adopted.

Some land was reassigned to Bedouin chiefs under land reform which began in 1952-53 under the Southern Rudd Project with 10 hectares plots of irrigated land being assigned to nomads and other landless people who wished to settle.

More recently, significant choices in policies and attitudes toward the social and legal positions of the nomadic peoples have been made. Officially, the policy of separatism is dead. All nomadic and semi-nomadic peoples presently living in Syria are looked upon as full citizens. As citizens, they are entitled to all services due any other citizen in the country, including health and education. These services are the same as the services to be delivered to any other group. This means that there are no special units to deliver health or education to nomadic groups. It is the responsibility of the regular ministries to see that these services are properly delivered

to the nomads, as they would be responsible for that delivery to any other group in the country. At the same time, the nomads officially no longer have a special status under the law.

On the other hand, it is recognized that the nomads and semi-nomads do have special problems and as such do require some special services although the delivery of these services should not differ from the delivery of special services to other groups -- for example, horticulturalists or poultry farmers. Therefore, the Bureau of Animal Health was broken up into the Directorates of Veterinary Services, Animal Husbandry and the Badia. It is only this last Directorate of the MAAR which deals specifically with the problems of the Steppe. The services of this office are seen as part of the routine services due any citizen undertaking a specialized way of life.

Each of these approaches--ending duality under law, national identification and sedentarization--increases the security and stability of the life of the nomads while offering them a greater stake in the future of the country as a whole. The policies offer more options to the mobile peoples, and the government is now taking responsibility for trying to work out a plan to improve the quality of life on the Steppe. As no comprehensive plan presently exists, some innovative social experiments are under way to develop one.

Range and Sheep Improvement Cooperatives

The backbone of the program to deliver social services to semi-nomadic peoples in the Syrian Arab Republic is the Range and Sheep Improvement (or alternatively the Sheep Production) Cooperative Program. According to figure from the FAO World Food Program 2018 Project (March 31, 1979), there are now a total of 46 such cooperatives in the Steppe with a combined membership of 11,194 households, involving 6,208,850 ha. of land and 983,011 head of sheep.

The land which has been assigned to these cooperatives, however, coincides, not accidentally, with the territory once occupied by the local tribes in the period before nationalization. The cooperatives, for all intents and purposes functions essentially the same as a tribe, under a new name.

The legitimization of specific territories, however, strengthens the pattern of small regular movements around a given center during the yearly transhumant cycle. By further limiting these territories, providing feedlots for meat production and supplementary feed for animals on the range, the circumference of these yearly movements can be further curtailed. This means that the operating radius of any semi-nomadic group might become small enough to warrant the setting up of central service delivery, and police protection. These centrally located units would then be in the reach of most members of the cooperative throughout most of the year.

At the same time, by making usufructory rights to land available only to the cooperative members, range improvement becomes economically feasible as well as technologically possible.

All sheep in cooperatives are privately owned. With privately owned flocks and publicly owned land, control of flock size becomes another major difficulty for the Syrian program. However, unless the sheep population is controlled, it is unlikely that any range management technique will be successful.

The first sheep cooperative was located in Essyrich, 150 km north-east of Aleppo, with 40 members and organized in 1968. Today, it is the largest in Syria.

The cooperatives program grew with the addition of the Bilas and Abu Rajmain cooperatives near Tudmor. By 1973, cooperatives were being formed in Aleppo and Al-Rakka Mohafazat. Cooperatives were not formed in Deir-ez-zor, Al-Hasakeh, Damascus or Dar'a until as recently as two or three years ago and neither non-Bedouin semi-nomadic nor full nomads (living in the southeast portions of Syria, called al-Hamad) are affected by the programs yet.

The entire cooperative program was initially supported by the UN/FAO WFP Syrian Project 002 which helped establish grazing control over 400,000 ha. in the Essyrieh cooperative area and reportedly provided feed for 55,000 sheep by 1970. A revolving fund (now called the National Feed Revolving Fund) was begun to help the cooperatives finance the cost of the feed.

Throughout the history of the sheep cooperatives, the Syrian Government has been using the supplementary feed program as a means of attracting membership to the cooperative movement, and has been trying to find a formula which would continue to attract members while putting a ceiling on flock size. This has proved elusive.

Government policy was again modified in 1979. It was decided that all breeders should become members of cooperatives in order to speed up the process of territorialization. In order to encourage this, all feed sales became the monopoly of the cooperatives. One must, therefore, be a member of the coop to get feed. On the other hand, there is no ceiling on the availability of feed to members, although the financing rule (110 head maximum) in all likelihood is still in force. The result of this ruling has been a rapid rise in the "on paper" formation of cooperatives and a growth in the size of cooperatives on the books. According to Behari and Marting (personal communication) the number of cooperatives in Deir-ez-zor, for example, has risen in one year from one to seven.

The new program therefore appears to be a successful recruiting tool for the cooperative movement, but the lack of ceilings on sheep ownership continues to be a disturbing element in the program.

Today, cooperatives are being established over all the steppe. It is part of the Syrian policy to reestablish some sort of localized control over every part of the Steppe by giving one cooperative authority over each area. The cooperative is therefore being placed in the position once held by the tribe. Since many of the cooperative leaders are the old tribal leaders and since cooperative boundaries are often the same as old tribal boundaries, establishment of localized control should not be difficult.

The Sheep and Range Station at Wadi al Azib was established in the midst of eight cooperatives. It provides, or will provide, continuous demonstration of the effects of controlled grazing, sheep-breed improvements, veterinary techniques, shrub transplantation and water management techniques.

It also provides, technical advisors to the cooperatives which would copy these techniques.

Service Centers at Cooperatives

By creating service centers as a part of cooperatives, a pattern might be formed which would allow improved social security for Bedouins on the Steppe, improvement of his social condition and at the same time permitting semi-nomadism to continue as a viable strategy for making a living. Only the Essyrieh cooperative has developed this concept far enough to say these services are present in any form. Additional services need to be quickly added here and a prototype or laboratory for later social programs begun here to be spread throughout the cooperatives system, along with the program of land management and improved production.

Other cooperatives already have areas mapped out where these facilities could be effectively located. Of the ten cooperatives in Hama, two have one feed warehouse and three have two feed warehouses each. These warehouses are conveniently located within the coop in an area where social service centers could be developed as well. Each cooperative is supposed to have a veterinary technician and either an agricultural engineer or technician. This is not the case at present. If the service center concept is adopted, health and educational programs would be provided and other programs as appropriate.

Conclusions

1. Bedouins will accept modern medicine for themselves, and veterinary care for their animals. They do want their children to be educated. If good services are provided, initial reticence will soon disappear because it is mostly due to unfamiliarity or the difficulties of distance.

2. The delivery of social services on the range should be connected to and an integral part of the functioning of the cooperatives. A successful core program should have the following characteristics:

-- Programs should use local people wherever possible.

-- The curriculum for children must include the standard Syrian curriculum and treat the Bedouin as an equal citizen.

-- Changes in school schedules should adjust the school year to the yearly transhumant cycle.

-- Train local people as a "barefoot doctor" or veterinary technician level to help solve staffing problems.

-- A range improvement program based on controlled grazing. Some means must be developed to limit the number of sheep grazing an area at any one time.

-- Support for programs against cutting of shrubs for fuel with research and programs in introducing the technologies of alternative energy sources such as solar and wind.

3. Long term success or failure of the monopoly distribution of feed for sheep through the cooperatives depends on biological, not political, realities and the number of sheep will have to be controlled with some system.

4. The program of water delivery is improving and continuing with new wells being dug, and old wells and cisterns being cleaned out--surface dams are being built and water-spreading techniques tried and demonstrated. There is need of improved management of animals around the wells. In the long run, new solutions will have to be found for tank trucks which are unreliable and costly.

5. The pickup truck and other motor transportation is very destructive to the vegetation on the Steppe. The government needs to help develop a solution to this problem.

6. The overall program seeks to increase the security of the Syrian Bedouins, while decreasing their dependence on the year-to-year changes in climate. At the same time, the program is attempting to

bring these people into the mainstream of Syrian life as equal citizens. This program would benefit with support in the following areas:

- Training for MAAR personnel in range management in university programs overseas.

- The development of training programs of MAAR officials in the country, on the job, in conservation, special veterinary problems and resource development.

- Supporting the social service delivery sector. An educator is needed to help develop a program of delivery in education for the Bedouin with a goal of one school in every cooperative center.

- Adding a health component as part of the service at the cooperative.

- Continuing support for potable water projects, and initiate an analysis program to check contamination and mineral content.

7. Support must be continued on basic research, for the biggest questions remain unanswered. For example, the question of how to limit flock size, or how to enforce territory can only be answered when more is understood and more is known about the Bedouins themselves. Policies must be in line with the patterns and expectations of the people, or projects and programs will fail.

Syria: Agricultural Sector Assessment

Volume 1: Summary Report

CHAPTER VI

AGRICULTURAL INSTITUTIONS

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CHAPTER VI

AGRICULTURAL INSTITUTIONS

The scope and direction of development in the agricultural sector are strongly influenced by the system of public institutions that has been established to achieve the nation's political, social and economic objectives. The constitutional framework and government structure provide the overall environment within which agricultural development takes place, while various public institutions, from central governmental agencies through to units at the village level, are engaged both in productive activities as well as in programs to support and promote agricultural and rural development throughout the country.

The general governmental structure is outlined briefly in the first section below, and this is followed by a review of the structure and functions of the Ministry of Agriculture and Agrarian Reform (MAAR), as well as of other ministries and organizations that are linked to the agricultural sector. Assessment is then directed toward key institutions engaged in agricultural research, education, extension and economic analysis. Detailed reports on institutional aspects of the agricultural sector are presented in Volume 5, Human Resources and Agricultural Institutions Annex.

A. Governmental Structure

While the governmental structure, as well as the nations's guiding principles themselves, reflect various aspects of Syria's very long history, the present system of government organization has been formed in the period since achievement of full independence in April 1946. Since the Revolution of 1963, the basic objective of the Syrian Arab Republic has been to build a popular democratic socialist state. The Corrective Movement of 1970 continued the commitment to the goals of the 1963 Revolution, but brought about a re-direction of priorities. Fundamental principles and government structure were then formalized in the Constitution of 1973.

Constitutional Framework

The Constitution of 1973 is the supreme law of the land. It defines the Syrian Arab Republic as a democratic people's state, republican in form, sovereign, socialist and part of the Arab homeland. The Ba'ath Party is recognized as the leading party in the society and state. People's Councils are to be democratically elected to represent citizens rights in the affairs of state. Cooperative societies are encouraged, and the state is to serve the people and have its institutions safeguard the citizens' fundamental rights.

The economy of the state is socialist and planned, and three types of property are recognized: State ownership of natural resources, public utilities and other public enterprises; collective property owned by popular and professional organizations, production units and cooperatives; and private property owned by individuals. Private property may not be expropriated except for the public good and only then when just compensation is made.

The educational system is to be free and mandatory for the elementary levels. Freedom is identified as a sacred right and the state is obligated to guarantee personal freedom with the supremacy of law a basic principle. Privacy is guaranteed for postal and telephone communication, as is freedom of religious beliefs. The right of free speech and press are guaranteed as are peaceful assembly and demonstration. Women are guaranteed opportunity for full and compete participation in the political, social, cultural and economic affairs of the country.

The Ba'ath Arab Socialist Party's ideologies include pan-Arab Unity, popular democracy, socialist transformation, and equalizing the distribution of wealth, services, and opportunities between the urban and rural areas. Syria is referred to a region of the Arab Nation, and the name used by the executive committee of the Ba'ath Party in Syria is the Regional Command.

Central Government Organization

Syria can be classed as a presidential republic, with the government organized into three distinct branches: Executive, Legislative and Judicial.

The legislative functions are carried out by the People's Council of 186 members who are elected in a general election for four terms. At least one-half of the members of the People's Council must be peasants or workers, and all members must be citizens who are at least 19 years of age.

The judiciary is independent and the President of the Republic, assisted by the Supreme Judicial Council, over which he presides, guarantees this independence. Judges are not subject to any authority except as prescribed by law.

The Executive Branch is headed by the President of the Republic. Candidates are nominated for the Presidency by the People's Council at the suggestion of the Regional Leadership of the Ba'ath Party, and assume the Presidency when elected by the citizens in a popular referendum. The Presidential term of office is for seven years.

The Council of Ministers is the highest executive and administrative body of the state. It consists of the Prime Minister, his Deputies and the Ministers. Under the chairmanship of the Prime Minister, this Council supervises the enforcement of laws and regulations, and generally controls the functions and organizations of the state in the discharge of their duties and responsibilities.

Ministers are the administrative heads of their ministries and are responsible for carrying out the general policies and programs of the state. Some Ministers of the State serve in advisory status without portfolios. Ministers may not be members or agents of private commercial establishments during their terms of office, practice in any profession, or compete for contracts with state agencies and organizations.

Local Government Organization

Since 1963, the Ba'ath Party has sought to increase autonomy and responsibility in the local and rural areas of the country. The rural areas are to be developed and the lower income workers and peasants are encouraged to assume a more important and direct role in the development process and in the political life of the country. In addition to the Agrarian Reform Program, under which land was redistributed to formerly landless peasants, another important change toward local autonomy was the Local Administration Law of 1971. Under this law, and with the establishment of the Ministry of Local Administration also in 1971, the objectives have been to make administrative units at all levels responsible for economic, cultural and social services, and to shift the direction of these affairs to local authority.

The country is divided administratively into 14 Mohafazats, or Provinces, which are corporate bodies and are the first level of government immediately below the central government.

Each Mohafazat has its own elected Mohafazat Council, an Executive Office, and a Governor (Muhafez) appointed by the President to be Chairman of the Council and Chief of the Executive Office. Governors are appointed to serve at the pleasure of the President.

The Mohafazat Councils are policy determining and deliberating bodies, with members serving on a part-time basis during their four-year elective terms. At least 60 percent of these members must represent peasants, laborers and people from the lower income levels.

The Executive Office, headed by the Governor, is the administrative body for the follow-up and day-to-day supervision necessary to carry out the governmental activities in the Mohafazat. Two-thirds of the Executive Office members are elected by the Mohafazat Council from among its members, and one-third are appointed by the Minister of local Administration. The Executive Office is responsible for supervising the central government's directorates, such as agriculture, public works and health, preparing annual development plans, contracting for local works projects, etc.

The Executive Office of the Mohafazat also provides some guidance to lower level Executive Offices in the Districts and Sub-Districts. Neither of these two are corporate or legal bodies, but are administrative sub-divisions of the Mohafazat. The Districts and Sub-Districts each have an Administrative Committee, and a chief of District who represents the executive authority of the government. The Chief's responsibilities include administration of district activities, such as security, welfare, health and law enforcement. Other local units of government include cities, town, counties and villages. All except villages under 5,000 population are corporate entities. In 1975, Syria had 51 districts, 160 sub-districts, 60 cities and towns, 391 counties and 6,293 villages.

B. Ministry of Agriculture & Agrarian Reform

The Ministry of the Agriculture and Rural Reform (MAAR) is a main focal point in national efforts to develop the agricultural sector of Syria. In addition, various other ministries and organizations are also linked to, and affect either directly or indirectly, the development of this sector. The scope and functions of these organizational units are first reviewed here, and then the proposed re-organization of the MAAR is examined.

Present Organization

The MAAR, as with other traditional government ministries, is headed by a Minister who is appointed by the Prime Minister and approved by the President. He is responsible for the direction and administration of the Ministry and carries out his duties in accordance with government policies and in line with directives of the Prime Minister and the Deputy Prime Minister for Economic Affairs.

Central Ministry

The administrative structure of the MAAR is based on a typical hierarchical pattern with authority pyramiding to the Minister. Three Deputy Ministers are responsible for the operations of the Ministry's various central departments. These departments are organized along both sectoral and functional lines, and their functions can be summarized as follows.

Deputy Minister:

- Department of Planning and Statistics. Supervises overall planning of Syria's agricultural programs, including the preparation of the Ministry's plan for development of the agricultural sector. Also responsible within the Ministry for agricultural statistics, general agricultural policies, legislation and some aspects of international relations.

- Department of Agricultural Affairs. Responsible for determining the agricultural inputs needed to achieve annual production plans, and for supervising the provision of these inputs to farmers. Also produces seedlings.

- Department of State Property and Agrarian Reform. Responsible for completing distribution of lands under the Agrarian Reform program, and for controlling state owned properties.

- Department of Extension. Responsible for the dissemination of technical information to farmers on agricultural production methods.

- Department of Plant Protection. Responsible for the identification of diseases, particularly in crops such as cotton and olives, and for providing spraying services to control diseases.

- Department of Forestry. Responsible for the protection, conservation and utilization of the country's forestry resources.

-- Department of Soils. Responsible for soil surveys and land classification and related agricultural and land development activities.

-- Department of Training and Education. Responsible for the education of students at the secondary schools of agriculture, and for training of staff in the MAAR and General Organizations.

-- Agricultural Bureaus. Three commodity oriented bureaus have been established to carry out production research, and to provide product quality control and other marketing services. Long established is the Cotton Bureau, located in Aleppo. More recently organized are the Citrus Bureau in Lattakia and the Olive Bureau in Idleb.

Deputy Minister:

-- Department of Agricultural Research. Supervises Syria's agricultural research affairs, including the collection of research data from the agricultural experimental stations located in various parts of the country.

Deputy Minister:

-- Department of Animal Husbandry. Supervises animal production in the country, including research the number of animals, selection for breeding, protecting animal fodder and designating pasture lands.

-- Department of Animal Health. Monitors animal health affairs throughout the country, including prevention and treatment of diseases.

-- Department of Rural Engineering. Responsible for rural construction, development of farmer housing, preparation of layouts for new farms, and providing technical specifications the purchase of agricultural equipment.

-- Department of Steppe, Range and Sheep. Responsible for Bedouin Affairs and for the management of grazing lands, including preparation of the plan for protection of forage for sheep especially during poor rainfall years.

In addition to the central department, which report through the Deputy Ministers, numerous other organizational units are required to report directly to the Minister. These include the following:

-- Department of Administrative Affairs. Responsible for budgets, accounting, personnel affairs, legislative and legal matters, related management functions.

-- Department of Real Estate. Responsible for the survey of agricultural land, the determination of land ownership, and the registration of titles to land.

-- Minister's Office for Organizations and Establishments. The Minister, with the assistance of his Office for Organization and Establishments, maintains direct contact with the heads of the General Organizations attached to the MAAR, the State Farms, the Ghab Project, and the Directorates of Agriculture in the Mohafazats.

Field Organization

In each Mohafazat, the MAAR has offices making up its own field organization. The principal one is the Directorate of Agriculture at the Mohafazat level. These organizations are smaller versions of the Central Ministry, and are organized sectorally. While the Directors of Agriculture are appointed by the Minister of Agriculture, as are also of the college graduates working at this and at subordinate levels, the tie in to the local government is through the Governor, the Ba'ath Party representative for agriculture in the Mohafazat, the chief of the Peasant's Union in the Mohafazat, and the Mohafazat Agricultural Council.

For technical backstopping and activities related primarily to the Ministry, the Directors of Agriculture report directly to the Minister of Agriculture or his delegated representative. But these Directors are also under the direction of the Governors of the Mohafazats. The Governors have paramount authority as Presidential appointees, and are the most influential officers in the Mohafazats. They also serve as the chairman of the Mohafazat Agricultural Councils.

The organizational divisions of the Agricultural Directorate in Aleppo Mohafazat, which follows, is typical of the structure of the 13 other Mohafazat offices, although there are some local variations: Administrative Affairs; Planning and Statistics; Agricultural Affairs; Government Land and Agrarian Reform; Land Use; Plant Protection; Forestry; Extension; Animal Health; Rural Engineering; and Steppe Lands and Bedouin.

There are subordinate offices or representatives stationed at the District (Mantika) and Sub-District (Nahia) levels which deal with agricultural matters. These are smaller in scale and more directly connected to the village and farm level needs. It is at the District and Sub-District

levels that licenses for agricultural production are issued to farmers. These licenses are related to the program targets in the agricultural plan and entitle the farmer to obtain loans from the Agricultural Co-operative Bank. In the Aleppo Mohafazat there are 8 District Offices and 24 Sub-district Units.

Specialized Agencies

The MAAR is also responsible for a number of government enterprises that have been established to engage in the production and marketing of various agricultural commodities and inputs, as well as for a special large-scale agricultural development project.

General Organizations: Six General Organizations that deal in agricultural commodities and inputs have been organized under legislative decrees and placed under the jurisdiction of the Minister of Agriculture. These organizations, and their headquarters locations, are as follows:

- General Organization for Poultry (Damascus)
- General Organization for Cattle (Hama)
- General Organization for Fodder (Damascus)
- General Organization for Seed (Aleppo)
- General Organization for Fisheries (Jableh)
- General Organization for Agricultural Machinery (Duma)

There are a number of additional General Organizations that have operations related to the agricultural sector, but these are under the jurisdiction of other Ministers and are noted below.

Each of the above General Organizations is responsible for establishing and operating various commercial enterprises for the production and marketing of commodities or for providing inputs in their agricultural sub-sector. For example, the General Organization for poultry operates egg and broiler farms and is constructing hatcheries, the General Organization for Cattle operates dairy farms, and the General Organization for Fisheries is engaged in the development of inland fish farms.

As in the case with other General Organizations engaged in industrial, commercial and financial activities, the agricultural General Organizations are administratively and financially independent units. They are governed by a board of directors and a general manager appointed by decree. However, each General Organization also reports to a Minister, such as the Minister of Agriculture. (Further aspects of the operations of various General Organizations in agriculturally related operations are given in Volume 4, Agricultural Marketing Annex.

State Farms: Six State Farms for crop production are operated under the jurisdiction of the MAAR, as follows:

Name	Location	Land Area (ha.)		Crop Produced in 1977
		Harvested	Total	
Al Hamadini	Aleppo	209	209	Cereals, Fruit
Al Manajeer	Al Hasakeh	553	639	Cereals, Industrial crops.
Saalo	Dier Ezzor	290	859	Cereals, Vegetables Industrial crops.
Al Rashed	Al Raqqa	6,699	11,289	Cereals, Industrial crops.
Al Hourieh	Lattakia	225	238	Cereals, fruit
Damascus	Damascus	269	269	Fruit
Labor	Damascus	na	na	na

The first six farms in the tabulation were created by Presidential Decree in May 1975, and according to the Statistical Abstract, in 1977 they had a total land area of 13,503 ha., of which 8,245 ha. were harvested. Their initial capital investments authorized in the decrees ranged from SL 1.5 to SL 18.9 million. Five of the farms produced cereals, 4 produced fruits or vegetables, and 3 produced industrial crops in 1977. The seventh farm above was created by decree in February 1979.

A number of other State Farms in Al Hasakeh were turned into production cooperatives for farmers whose lands were inundated following completion of the Euphrates Dam. (Further details on State Farms are given in annex reports on land tenure and rural change, see Volume 5.)

The Ghab Project. In Idleb Mohafazat, a special agricultural project area has been created. Except for the very large Euphrates Project, which has its own Ministry and which encompasses areas in more than one Mohafazat, the Ghab Project is the only district of its kind. An independent management organization was set up in 1951 to drain the swamps and provide the necessary irrigation facilities. In 1959 this organization was replaced by the major Projects Administration of the Ministry of the Public Works and Water Resources, which was responsible for the initial construction works. At present the Ghab Project is being administered by a General Director who reports directly to the Minister of Agriculture. Coordination at the local level is obtained through the Idleb Governor who chairs meetings with representatives of the various ministries and other organizations which have personnel and programs in the project area.

Agricultural Councils

A Supreme Agricultural Council (SAC) was established in 1975 under a law requiring that all agricultural activities be planned each year and coordinated so as to maximize production. The Council is responsible for approval of plans and for their follow-up to assure effective implementation. To this end, the SAC's principal functions are to approve agricultural production targets for selected products; fix production prices for these products; approve agricultural credit policies; fix prices for selected production inputs, chemicals, fertilizers, etc; approve marketing policies for commodities within government programs; and provide over-all coordination and supervision for the policies and roles of all agencies involved in the planning and implementation agricultural programs under government direction.

The SAC's membership is composed of the Prime Minister, Chairman, the Deputy Prime Minister for Economic Affairs, the Ba'ath Party's Senior Representative for Peasant Affairs, the Executive Director of the Peasant's Union, and the Ministers of Agriculture and Agrarian Reform, Planning, Economy and Foreign Trade, Industry, and Supply and Home Trade.

The follow-up function of the SAC is carried out by a sub-committee headed by the Minister of Agriculture & Agrarian Reform. Its members include the three Deputy Ministers, plus three other persons at the department head level of MAAR selected by the Minister, the Executive Director of the Peasant's Union, the Secretary of the Peasant's Office of the Ba'ath Party, and the Director of the Agricultural Department in the Ministry of Planning. Other government officials may serve as ad hoc members of the SAC sub-committee when invited by the Minister. This is usually done for expertise on a particular subject, i.e., Director of the Agricultural Cooperative Bank for credit matters, etc. This committee is responsible for monitoring the implementation of all agricultural plans and programs and is responsible to recommend plan changes where necessary including the adjustment to government set commodity and input prices.

Mohafazat Agricultural Councils were also created by law to serve the needs of planning and follow-up at the provincial level. Each is chaired by the incumbent Governor and its membership includes the Chief of the Mohafazat's Peasant Union, the Director of Agriculture, the Branch Director of the Agricultural Cooperative Bank, a representative of the Executive Office of the Mohafazat and the Mohafazat's Ba'ath Party representative responsible for peasant affairs. These Councils develop local plans, make recommendations and pass them up to the central level. They also monitor and coordinate implementation of projects in these respective areas.

Similar but less structured Councils are also prescribed for the subordinate administrative units of government in the Districts, Sub-Districts and Villages. This is to permit communications on matters of agriculture to flow through official channels from the bottom to top and vice-versa.

Other Organizations Affecting Agriculture

While the MAAR plays a decisive role in the agricultural sector, various ministries and certain General Organizations under Ministerial jurisdiction, as well as such other organizations as the General Peasant's Union and the Agricultural Cooperatives also strongly influence this sector's development.

Ministries and General Organizations

Ministry of Supply and Home Trade. This Ministry has an important influence on the agricultural sector since it has responsibilities relating to the marketing of both domestic and imported foods, recommends profit margins, estimates nutritional requirements, projects food production and import needs, etc. The current structure is new, having been set forth by the Minister in April 1979, and includes a Consultative Council and 12 Directorates in the central Ministry, as well as Directorates located in the Mohafazats. There are also a number of General Organizations reporting to the Minister.

A Consultative Council has been established with responsibilities for determining basic principles regarding supply and home trade, pricing, and other activities of the Ministry as directed by the Prime Minister, the Supreme Council for Planning and the Economic Committee. Headed by the Minister and composed of top Ministry officials, the Council reviews draft laws and decrees, and all trade, supply and pricing matters. It also provides for coordination among the various organizational units within the Ministry's jurisdiction.

The broad scope of the Ministry's functions are indicated by the major activities of certain directorates and departments, especially those relating to commodity marketing and pricing. In addition to several departments involved with overall planning studies, the Directorate of Pricing recommends prices and allowable profit margins for both imported and domestically produced food, and monitors prices to determine if policies and regulations are being adhered to. Similar functions are carried out with regard to non-food commodities as well.

The Directorate of Food Commodities, through its Departments of Fruits and Vegetables, Cereals and Bread, and other Foods, determines national requirements for these commodities, as well as their supply situation, and recommends, as necessary, regulations as to the production, transport and consumption of foodstuffs. The Directorate of Home Trade has departments to monitor the activities of retailers and wholesalers in the private sector, and is responsible for the regulations and relations with public companies. A similar Directorate deals with Cooperative Trade.

A number of General Organizations report to the Minister of Supply and Home Trade. While these organizations are engaged primarily in operations relating to retail trade and consumer goods of various types, the agricultural sector is strongly influenced by the General Organization for Trading and Processing of Grain. This Organization has the state monopoly for grain trade and is the sole legal purchasing organization. Also, among the Companies under this Organization are the General Company for Mills and the General Company for Baking. In addition, the General Company for Exploitation of Grain Silos, Feed Plants and Seed Plants also reports to this Minister.

Ministry of the Euphrates Dam. This Ministry is responsible for overall development of the Euphrates Basin, including both hydroelectric power generation and irrigated agriculture. Dam construction and power generation have been assigned to the General Administration of the Euphrates Dam, while the construction of the canal and drainage system, as well as the development of irrigated agricultural production are assigned to the General Administration for the Development of the Euphrates Basin.

Ministry of Public Works and Water Resources. Other than in the Euphrates Basin, this Ministry has responsibility for all aspects of water resources development in the country, including dams, irrigation networks, surface water and ground water.

Ministry of Industry. This Minister has under his jurisdiction a number of agriculturally oriented General Organizations, including the following: The General Organizations of Food Industries which operates plants for processing fruits, vegetables and milk, vegetable oil extraction, onion drying, and brewing of beer; The General Organization for Chemical Industries which operates fertilizer factories and tanneries; The General Organization of Textile Industries which has factories for cotton and wool spinning and weaving and for cloth and clothing manufacture; and the General Sugar Organization which operates the nation's sugar factories.

Ministry of Petroleum and Mineral Resources. Reporting to this Minister is the General Company for Phosphates and Mines, which mines raw materials for use in the manufacture of phosphate fertilizers.

Ministry of Economy and Foreign Trade. In addition to its overall responsibilities for foreign trade affairs, including imports licenses and export controls, this Ministry has jurisdiction over two General Organizations that strongly influence the production and marketing of important agricultural export crops. These are the General Organization of Tobacco which is responsible for the production, manufacturing and marketing of tobacco products, and the General Cotton Organization which is responsible for the ginning and marketing of cotton, as well as construction of storage facilities.

This Ministry also has jurisdiction over the Agricultural Cooperative Bank, which is responsible for financial and banking matters involved in the funding of agricultural development activities.

General Peasant's Union and Agricultural Cooperatives

After the merger of the Ministry of Agrarian Reform with the Ministry of Agriculture in 1968, agricultural cooperatives of all types were organized under a Central Cooperative Union. The government technical staffs supervising and assisting these cooperatives were also combined. In 1974, legislation provided that the General Peasant's Union (GPU) absorb the Central Cooperative Union.

Over 90 percent of the present cooperatives are of the multipurpose type, and the balance are specialized associations relating to sheep, cattle, poultry or fisheries. The multipurpose cooperatives can engage in wide-ranging activities but do one more of the following: Obtain credit for members from the Agricultural Cooperative Bank, market members' agricultural crops and products, and acquire and operate modern agricultural machinery.

Legislation specifies the essential role of farmer members in the operation of the associations, with technical staff provided to direct and assist with the management and activities of the cooperatives.

The General Peasant's Union, while organizationally an independent entity within the structure of the Syrian government, is closely associated with and partially dependent on the MAAR, and other agencies to a lesser degree, for technical personnel. The Union is empowered to have technical personnel seconded from government agencies to serve the needs of the Union and its member cooperatives.

There are also close relationships between the Peasant's Union and the Agricultural Cooperative Bank, the Ministry of Local Administration and the fourteen Mohafazats.

The General Peasant's Union and the Agricultural Cooperatives were established under, and operates according to Decree No. 21 of 20 April 1974. Cooperatives are to be organized at the village level, and they are to have a minimum of 30 members. The cooperatives and their members are consolidated at the Mantika level into a Mantika Association. The Mantika Associations again consolidate at the Mohafazat level and are called the Mohafazat Peasant's Union. The fourteen Mohafazat Unions then make up the General Peasant's Union.

The purpose of the law were "to unify the farmers efforts, to strengthen their roles in the socialist transformation in the rural sector, and to creat a dynamic, socialist and cooperative agricultural sector". The new organization was given the following functions:

The Organization Function. It aims at liberating farmers from tribal, sectoral and regional bondage and at unifying farmers, in their struggle and efforts, to raise their economic, educational, social and health standards.

The Political Function. Winning of farmers so they would be part of the socialist, nationalist struggle, and instead of being the marginal segment of the society, they will realize the objectives of the Arab nation, i.e., Unity, Liberty and Socialism.

The Agricultural Function. The farmers' organizations contribute to the realization of the agricultural revolution via their contribution to the success of the agricultural plans, the elimination of the antiquated agricultural modes of production and the creation of a modern and dynamic agriculture.

Proposed Re-organization of the MAAR

In February 1977, the Prime Minister convened a seminar organized to discuss problems hindering the development of the nations' agricultural sector. In opening the seminar he called attention to the vital importance of agriculture to Syria and to other Arab countries, as well as to the potential that exists for greatly expanding agricultural production. But he also notes that various political, economic, financial and human factors have contributed to problems in achieving rapid agricultural development. He called upon the seminar participants, composed of both technical specialists and political leaders, to recommend solutions to these problems.

In addition to numerous technical recommendations made for solving problems in each of the agricultural sub-sectors, the seminar also adopted several general recommendations that called for study of the administrative systems of the agencies involved in the agricultural sector, for the development of a plan for re-organization of the MAAR for better implementation of the seminar's recommendations, and for devising of systems that would provide financial incentives for employees in the agricultural sector as well as raise workers' productivity.

The study team formed to carry out these recommendations examined the present organizational structure and functions of the MAAR and reached the following conclusions:

- The present organizational structure does not have a consistent basis for dividing the Departments according to sectors or tasks. Some of them are operationally specialized, such as research which is found in several branches, and some of them are sectorally specialized without specific functional determination.

- Research appears to be limited largely to plant production.

- The Directorates of Agricultural Affairs and Animal Production do not have well identified tasks.

- No field personnel are available at the producer level to supervise and help in planning, implementing and educating the rural people. Extension is limited to a small group of people in the Directorate of Agriculture Affairs who issue some publications.

- Forming and implementing development policies for animal development are divided between the central administration and specialized organizations.

- All directorates follow the same stratification: departments, divisions, office, section, etc.

- Production, services and training tasks are mixed among the different directorates, the central administration, and the specialized organizations.

These organizational conditions, together with other factors, have led to various negative aspects, including loss of a sense of responsibility; under-employment of staff, especially in the Mohafazats and Mantikas; most employees in the offices are occupied with routine work; wide gaps between plans and accomplishments; inadequately trained supervisory staff; and limited delegation of authority and decision making.

After considering various forms of organizational structure to overcome problems such as the above, the study team proposed a functional divisioning as follows:

- Separate the planning, policy formulation and general supervision functions from the implementation responsibility in both services and production fields.

- Limiting the tasks of the central administration and its branches in the Mohafazats to supervision, orientation and planning, and providing non-commercial services.

- All commercial services (such as providing commodities or services against a cost paid by the beneficiary) should be done by the specialized General Organizations .

- Feasibility and economic studies of projects, commercial types of work etc., should be done by an independent organization which should also supervise the implementation for a fixed cost.

- Adopt special procedures for dividing the work and assignment of employees in accordance with job requirements of the particular unit.

In line with this approach, it was proposed that the central Ministry be based on functional groupings of specialized Directorates, with each of the groups headed by a Deputy Minister as follows:

- Deputy Minister for Planning: Include Directorates of Plans and Follow-up, Statistics, Agricultural Policies, Agricultural Legislation, International Activities.

- Deputy Minister for Agricultural Resources: Includes Directorates of Forestry, Steppe, Soils and Water, State Property and Agrarian Reform.

- Deputy Minister for Agricultural Research: Includes Directorates of Plant Research, Animal Research, Economic Research and Statistical Analysis, Agricultural Research Centers.

- Deputy Minister for Agricultural Services: Includes Directorates of Agricultural Extension, Education and Training, Animal Husbandry, Plant Protection, Agricultural Quarantine.

- Deputy Minister for Administrative Affairs: Include Directorates of Personnel, Finance, Public Relations.

The Ministry's field staff should play a principal role in orienting activities at the Mohafazat and Mantika levels, mainly with regard to extension, training, animal husbandary, and plant protection. An exception is made for agricultural research which needs to be centrally planned and supervised. This is also true for agriculture policies and international activities of the planning group. All other function of the Ministry of Agriculture should be carried out in the field by field staff. Responsibility for directing and supervising this staff is from the central administration passing down through the Mohafazat and the Mantika offices. Therefore, the higher level should be composed of smaller number of trained specialists in contrast to the field staff which should contain the generalists and be increased as necessary to man the new basic centers in the rural areas.

It should also be emphasized that field work will be an empty concept in research, service or planning if not accompanied by two main factors. The first factor is programming to determine the nature, quantity, and scheduling of each agricultural technician's work. This includes the objectives to be realized during each period and the means for their implementation. These objectives may be the number of cows treated, vaccinated or artificially inseminated; or the area to be fertilized or planted. The second factor is the means to accomplish the objectives. This requires that adequate types of housing be provided for the technicians wherever these are not available. It means providing transportation and incentives to the technician for working in the field.

The intention is that the technical divisions working in the Mohafazat and Mantika should lead the field work at the centers. It is recommended that the Agricultural Director in the Mohafazat be helped by four Deputies. The first to supervise the divisions of planning, follow-up, statistics and legislation; the second is to supervise the divisions of forestry, steppe, soils, and state property; the third to supervise the divisions of extension, education and training, animal husbandary, plant protection and health quarantine; and the fourth to supervise the divisions of administration, finance, and public relations. At the Mantika level it is proposed to provide technical divisions to handle the following jobs: planning, statistics, legislation, state property, extension, animal husbandary, and plant protection, as well as steppe or forest where relevant.

It was mentioned earlier that all work of a commercial nature should be carried on by specialized organizations of the MAAR. It was also emphasized that the function of these organizations should be limited to commercial types of work. Any other function such as orientation or supervision pertaining to the sub-sector where the organization is suited,

should be excluded based on a principle of separating the management function from the implementation function. Setting policy on feed quantities, prices, and distribution procedures is a management task carried out by the Directorate of Agricultural Policy while the purchase and sale of these feeds, their storing and distribution should be handled by the specialized organizations. In other words, management and policy formulation are strictly functions of the central administration, while the implementation of such policies will be the responsibility of the specialized organizations.

The development of the agricultural sector will require the existence of the following organization:

1. Agricultural Cooperative Bank
2. General Organization for Cotton Processing and Marketing
3. General Organization for Tobacco
4. General Organization for Sugar
5. General Organization for Food Industries
6. General Organization for Cattle
7. General Organization for Poultry
8. General Organization for Fishery
9. General Organization for Fodder
10. General Organization for Seed
11. General Organization for Agricultural Machinery
12. General Organization for State Farms
13. General Organization for Euphrates Basin Cultivation
14. General Company for Tree Plantations
15. General Company for Agricultural Pest Control
16. General Company for Agricultural Projects Studies

The first three organizations are presently attached to the Ministry of Economy and Foreign Trade, while the 4th and 5th are under the Ministry of Industry. It is recommended that they be put under the jurisdiction of the Ministry of Agriculture.

The 6th through 11th organizations exist at the present time and are under the MAAR. The 12th through 16th should be established to handle the remaining commercial functions and should also be under the jurisdiction of the MAAR.

The General Organization for Agricultural Machinery should handle all machinery distribution, maintenance and rental, and should open distribution centers, workshops and rental stations throughout the country.

The General Organization for Euphrates Basin Cultivation should deal with all agricultural aspects of the Euphrates project and the agricultural work now under the General Organization for the development of the Euphrates Basin should be transferred to this new organization. The new organization would also receive the new reclaimed lands when all facilities has been completed. These lands would then become state farms or cooperative lands holding, and if the latter, would be transferred to the Peasant's Union.

According to Law 18, General Organization of State Farms should be established . Since these farms are considered as economic entities, they should be included in one organization. It is also proposed to establish a General Company for Tree Plantations to carry out the special operations of reclaiming mountain lands to orchards. This should be a commercial operation involving both the public and the private sector since the country presently does not have such services. Many farmers in the mountain area would establish their own orchards but they lack the financial means to do so. The Agricultural Cooperative Bank could provide medium and long-term credits for this kind of enterprise. In the case of state-owned land, tree plantation would be ready after plantating to form specialized state farms or to establish co-operatives.

Conclusions

1. The re-organization proposal to place agricultural responsibilities, organizations and personnel under the supervision of the MAAR seems organizationally sound. However, the study underlying the proposal did not develop a fully staffed-out analysis of the effect of the new organization on performance. For example, will costs be reduced, what services will be improved, will red tape be eliminated, where will responsibilities be fixed, etc.? A case in point is the proposal to shift the Agricultural Cooperative Bank (ACB) from the Ministry of Economy and Foreign Trade to the MAAR. The widespread activities of ACB in such areas as fertilizer distribution may argue for closer control by the MAAR. On the other hand, the ACB is a bank, performing banking services, so perhaps it should remain in the family of banks under the Ministry of Economy.

These comments do not mean that proposed re-organization would not be an improvement or that they should not be made. Rather, the total effects of the proposed changes should be analyzed, their inter-relationships understood and the benefits to be derived set forth clearly.

2. In addition to organizational re-structuring, attention should also be given to improving public administration of the resources and personnel being utilized by the MAAR. Since administrative management is recognized as a government-wide problem, it is recommended that a management consulting firm or institute, specializing in public administration, be obtained to assist the Organization and Management Directorate (OMD) of the Prime Minister's Office in conducting an in-depth public administration study of the entire governments operations and organizations.

3. Perhaps the most critical element in governmental administration is the absence of a core of public officials with the necessary specialized training in supervisory and administrative skills. Although there is a recognized need for modernized personnel practices, there is no central personnel agency in the government, salaries of government employees have not kept up with raising costs, there is a patchwork of special pay rates, there are no incentives for superior performance, etc..

It is recommended that a specialist in personnel administration be obtained (as part of 2. above, or separately) to advise on the setting up of a central personnel agency, developing a new employees career service law, and establishing a modernized system of personnel practices.

4. The OMD in the Prime Minister's Office should have additional specialized staff. Also intensive training of employees for this office, and for staff to fill other management administration positions in each ministry, should be arranged as soon as possible.

5. Middle management and supervisor/foreman type training should also be initiated immediately in country and preferably on-the-job or after-the-job.

6. The OMD should be given the responsibility for approving, or at least concurring in, any proposed organization or re-organization of government agencies to help with this specialized work and to assure that standardized nomenclature of organizational units is used.

7. Increased attention should be given to planning administration, as contrasted with only planning, in order to assure professional staff analysis of proposed programs and plans, as well as to improve implementation of approved programs and plans.

8. To further implement policies on increasing citizen participation in local government administration, greater responsibility and authority should be given to the Mohafazat Councils on a gradual basis. Also, competent and trained manpower must be attracted to job opportunities in the local and rural areas. This will require real employment incentives.

9. It has been recommended in other reports that a separate Mohafazat be created for the steppe. Also, other areas may have, or may develop, problems requiring a regional approach for solution. However, re-organization of geographic administrative units may not always be feasible. A coordinating organization, such as an institute or regional authority, empowered and funded to work within the delineated area, would be an alternative in such cases.

C. Agricultural Research

The Ministry of Agriculture and Agrarian Reform (MAAR) has primary responsibility for conducting agriculture research. However, research relating to Syrian agriculture is also conducted by a number of other Syrian and international organizations.

The agricultural research program in Syria has been assessed by a number of groups in the past. Many of the recommendations of these groups have been at least partially implemented, but many of the conclusions reached and proposals made are still pertinent to consider in any future plans for strengthening the program.

-- In 1954, the International Bank for Reconstruction and Development had a team in Syria for three months. This team stated that the 18 Experiment Stations at that time were working more or less independently of each other, and recommended the establishment of a Central Research Station near Damascus to coordinate all agriculture research.

-- In 1962, FAO signed a five year contract to assist the Syrian government plan and administer an agricultural research program. Among other recommendations, the FAO group proposed that an Agricultural Research Council be established "to develop an effective mechanism for coordination of research with extension and higher education in agriculture". This Council was formed in 1962, and a draft decree was prepared for legally establishing the Department of Agricultural Research.

-- In 1969, an Agricultural Research Council was established by order of the Minister of Agriculture and Agrarian Reform which differed somewhat in function and organization from 1962 Council. Its aims were to study the organizational and other problems of the Department of Research, to draw up annual and long-term programs of research, to evaluate research results and strengthen the research program within the Ministry, and to coordinate the research program with extension. A Council report stressed: "There can be no effective coordination of research with extension unless an efficient agricultural extension service is already available".

-- In 1977, the Agricultural Symposium assessed the status and future direction of agricultural research, and adopted a set of general recommendations as follows:

1. Form a Higher Council for Agricultural Research to plan and program agricultural research, propose coordination procedures, and open an Agricultural Center Library,
2. Open several branch research centers that will cover all of the environmental regions on the country,
3. Provide more dependable financing, special training for staff, and encourage cooperation with university staff and researchers in other Arab countries , and
4. Stress several themes in research not given emphasis previously, including economics and social research.

Details in the general recommendations and on specific themes are given in the Agricultural Institutions Annex.

Agricultural Research of the MAAR

Research Facilities

The MAAR has 17 research stations which are widely distributed and represent all major type of farming areas, see Table VI-1. The stations have a total of 1,213 hectares, of which 260 hectares are irrigated and 953 hectares are non-irrigated land. They range in size from 4 hectares at Douma, all of which is reportedly irrigated, to 420 hectares at Himo, all of which is non-irrigated. In general, building facilities were judged to be extremely limiting. With a few exceptions, laboratory buildings and equipment ranged from minimal to non-existent. Also, with one or two exceptions, offices were very crowded. Secretarial assistance generally was not available. Housing for professional staff was not available even though many of the stations are in need of new equipment. They usually have one or more relatively new large tractors, but small tractors needed for experimental field work are old and in need of replacement. Tillage, planting and harvesting equipment suitable for plot work is needed. Training facilities were very limited so that only field demonstrations could be used in meetings with farmers or students from the universities or institutes. Without facilities or support services for preparation of publications, and with only limited opportunities to meet with farmers, information exchange between farmers and researchers appeared minimal.

Table VI-1. MAAR Agricultural Experimental Stations, SAR, 1979

Station	Mohafaza	Mantika	Stabiliza- tion Zone	Area (ha.)		Principal Enterprise Research Focus
				Irri.	Rain.	
Izra'	Dar'a	Izrau	2	0	100	wheat
Jellin	Dar'a	Dar'a	1b	0	100	wheat
Ein el Arab	Sweida	Sweida	1b	25	35	grapes, apples
Region I: (Dar'a-Sweida)				25	235	260
Douma	Damascus	Douma	4	4	0	stone fruits
Karahta	Damascus	Douma	5	17	0	wheat
Kharabou	Damascus	Douma	4	12	0	maize
Sargaya	Damascus	Bdant	1	13	3	pears, apples, potatoes
Region II: (Damascus)				46	3	49
Homs	Homs	Homs	2	35	0	vegetables, fruit
Ghab	Idleb	Ghab	1a	0	84	wheat, barley
Hama	Hama	Hama	1b	20	20	sheep, potatoes, fruit
Jableh	Lattakia	Jableh	1a	0	20	citrus, vegetables
Region III: (Homs-Hama-Ghab-Lattakia)				55	124	179
Aleppo	Aleppo	Aleppo	1b	9	10	pesticides, wheat, sugar beet
Al-Rakka	Al-Rakka	Al-Rakka	4	95	0	fruit, wheat
Deir-ez-zor	Deir-ez-zor	Deir-ez-zor	5	20	10	salinity
Region IV: (Aleppo-Al-Rakka-Deir-ez-zor)				124	20	144
Al-Hasakeh	Hasakeh	Hasakeh	3	0	110	wheat, legumes
Himo	Hasakeh	Kamishli	1b	0	420	wheat
Tartab	Hasakeh	Kamishli	1b	10	41	wheat, stone fruits
Region V: (Al-Hasakeh)				10	571	581
COUNTRY TOTAL				260	953	1,213

SOURCE: Personal field visits to stations, February 1979.

Research Staff

The professional staff of the Ministry of Agriculture's Experimental Stations totals 229 see Table VI-2. A break-down by education shows 12 staff members with Ph.D. degrees, 20 with the M.S., 151 with the B.S., and the rest with less than a B.S. degree. The Douma station in Damascus Mohafazat alone accounts for 45 percent of the personnel working in research, which together with the other three Damascus stations add to almost 60 percent of all research personnel.

About 75 percent of the research are able to understand English, while 35 percent can use French, and 25 percent can communicate in a language other than French or English. (Questionnaire, MAAR 1979).

Research Program

The research program of the MAAR has focused almost entirely on agonomic problems with only very limited work on livestock production, and none on farm management, marketing or other economic or social science areas. Within the crop area, priorities appear to have been assigned on the basis of the importance of the crop as measured by its use of resources, value of production, or its possible contribution to attainment the self-sufficiency goal. Strong emphasis has thus been given to (1) food and feed grains, (2) vegetables oil crops, (3) sugar beets, and (4) fruits and vegetables.

The scope of the program is indicated by the projects listed in the 1978-79 executive plan for Agricultural Research, see Table VI-3. Lines of research undertaken by other organizations, most of which have been underway for several years, are also indicated. The 161 MAAR projects at 11 stations relating to wheat account for well over half of all projects. Corn, although not extensively produced currently, ranked second in importance as indicated by number of projects. Other crops receiving major attention were chickpeas, sugar beets, barley, and lentils. Projects relating to a variety of vegetable oil crops collectively accounted for a substantial portion of the total. Also, a number of stations have projects relating to perennial tree or vine crops that were initiated earlier, some of which are continuing.

Table VI-2. Professional Staff of MAAR Agricultural Experimental Stations, SAR, 1979

Station	Mohafaza	Education				Education			Total
		Ph.D.	M.S.	B.S.	Inter- mediate	Ag. High School	Gen. High School		
Hama	Hama	1	11	1	1	1	1	16	
Aleppo	Aleppo	1	1	14	0	1	1	18	
Rakka	Al-Rakka	0	0	1	0	0	0	1	
Deir-ez-zor	Deir-ez-zor	0	0	1	0	2	0	3	
Jableh	Lattakia	3	1	15	3	1	0	23	
Ghab	Idleb	0	0	1	0	2	0	3	
Douma	Damascus	6	4	82	1	12	0	105	
Karahta	Damascus	1	0	13	1	1	0	16	
Ein el Arab	Sweida	0	0	3	0	5	0	8	
Izrau	Dar'a	0	0	6	1	2	0	9	
Sargaya	Damascus	0	0	0	0	1	2	3	
Moujarja*	Al-Hasakeh	0	0	2	0	0	0	2	
Himo*	Al-Hasakeh	0	0	0	0	0	0	0	
Tartab*	Al-Hasakeh	0	0	0	0	0	0	0	
Homs	Homs	0	1	3	1	2	1	8	
Kharabou	Damascus	0	2	8	1	1	0	12	
Gillian	Dar'a	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>2</u>	
TOTALS		12	20	151	9	32	5	229	

*Stations operated by the same professionals.

SOURCE: Research Directorate, MAAR (1979).

Table VI-3. MAAR 1978-79 Executive Plan for Agricultural Research, SAR

Station	Mohafaza	Total Experi- ments	No. of Experiments Mentioned in 1978-79 Plan										Saf- flow.
			Wheat	Barley	Lentils	Chick- peas	Broad Beans	Corn	Sugar Beets	Peanut	Soya	Sesame	
Izra'	Dar'a	39	20	7	4	6	0	1	0	0	0	0	1
Jellin	Dar'a	15	8	0	1	1	1	3	0	0	1	0	0
Ein el Arab	Sweida	0	0	0	0	0	0	0	0	0	0	0	0
Douma	Damascus	1	0	0	0	1	0	0	0	0	0	0	0
Karahta	Damascus	44	29	3	3	3	0	0	2	0	1	0	3
Kharabou	Damascus	10	0	0	0	0	0	10	0	0	0	0	0
Sargaya	Damascus	0	0	0	0	0	0	0	0	0	0	0	0
Homs	Homs	22	13	0	0	0	0	4	4	1	0	0	0
Hama	Hama	24	10	3	0	1	4	4	0	0	0	0	2
Ghab	Idleb	15	10	X	1	0	0	1	2	0	0	0	1
Jableh	Lattakia	7	0	0	0	0	2	4	0	1	0	0	0
Aleppo	Aleppo	36	19	X	1**	1**	1**	1	4	3	0	1	2
Rakka	Al-Rakka	15	8	X	0	0	0	4	2	0	1	0	0
Deir-ez-zor	Deir-ez-zor	30	19	0	1	2	1	0	4	1	0	1	1
Moujarja	Al-Hasakeh	23	14	3	0	2	0	0	0	1	1	0	2
Himo	Al-Hasakeh	16	11	0	3	2	0	0	0	0	0	0	0
Tartab	Al-Hasakeh	3	X	0	0	0	0	3	0	0	0	0	0
TOTALS		300	161	16	14	19	9	35	18	7	5	2	12
Other agencies:													
GADEB			X	X	X	X	X		X				
Tobacco Monopoly													
Cotton Bureau													
Seed Multiplication Bureau			X				X	X					

** = in cooperation with ICARDA; X* = research done in previous years, ongoing.

(continued)

Table VI-3. (Cont'd.)

Station	Mohafaza	Research Conducted by Other Agencies or in Previous Years by Research Directorate						
		Potatoes	Stone Fruits	Citrus	Cotton	Tobacco	Tomatoes	Grapes Olives
Izra'	Dar'a							X*
Jellin	Dar'a							
Ein el Arab	Sweida		X	X				X
Duma	Damascus			X				X
Karahta	Damascus							
Kharabou	Damascus							
Sargaya	Damascus	X	X					
Homs	Homs		X					
Hama	Hama	X						
Ghab	Idleb							
Jableh	Lattakia		X			X		
Aleppo	Aleppo		X		X			
Rakka	Al-Rakka		X				X	
Deir-ez-zor	Deir-ez-zor							
Moujarja	Al-Hasakeh							
Himo	Al-Hasakeh		X					
Tartab	Al-Hasakeh							
Other agencies:								
GADEB								
Tobacco Monopoly					X		X	
Cotton Bureau					X			
Seed Multiplication Bureau		X			X			

** = in cooperation with ICARDA; X* = research done in previous years, ongoing.

SOURCE: Executive Plan for Agricultural Research, 1978-79, MAAR; and personal field visits.

Other Agricultural Research Agencies

The Euphrates Project

The Ministry of the Euphrates Dam has the responsibility for agricultural research as it relates to the land and water now becoming available in the Euphrates project. Experimental farms have been established in areas representing the major land types of the Balik Basin and the Euphrates Valley. Research is conducted to determine optimal or feasible irrigation and cultural practices for crops proposed for production on the various soil types. Research is conducted by GADEB at six stations by having agricultural engineers with special training who live in Rakka and go to each station as needed. Results of research are introduced into the farming practices of the 15 pilot project farm.

Cotton Bureau

The Cotton Bureau, formed in 1952, is a semi-autonomous agency of the MAAR. Its headquarters are located in Aleppo, which is the geographic center of the cotton growing region of Syria. In addition to general supervision of the production and marketing of the country's cotton, the Bureau is responsible for carrying out experiments designed to develop better cotton varieties and practices.

The research program of the cotton Bureau has a reputation for being a successful one. Increased production has resulted from the increased yields of the varieties developed and introduced into Syrian agriculture since 1971. In that year "Aleppo 1" was introduced, and five years later yields of the areas planted in cotton with this new variety had increased by nearly 44 percent. A new variety, "Aleppo 40" is being introduced presently.

This research program has been able to attract professionals and conduct long-term investigations which have been made possible by an independent financial and administrative apparatus. Only one-third of the Bureau's financing comes from the MAAR, mostly for fixed annual costs. Two-thirds of the Bureau's budget comes from the Cotton Festival Committee, which in turn receives most of its financing from its share in the National Lottery.

Another unique feature of the research system of the Cotton Bureau is the fact that most research plots (2-5 ha. each) are rented from farmers in different areas where cotton is grown. Cotton is repeatedly planted on these plots year-after-year to reproduce the most unfavorable conditions as far as pest management is concerned so that techniques for controlling these problems can be developed for each variety being tested.

Tobacco Institute

The Tobacco Institute, administratively under the Minister of Foreign Trade, conducts research on the selection of the best varieties of tobacco as measured in terms of their productivity and adaptability to processing , and the appropriate ways of planting, producing, maturing, harvesting, processing and fertilizing tobacco under the soil and climatic conditions in the Tartous and Lattakia areas.

Success has been achieved in getting the Institute's research results into the hands of producers through the use of special production contracts and close supervision.

University of Aleppo

Currently there are four research projects underway in the faculty of agriculture of the University of Aleppo. Each is being carried out in conjunction with international agencies.

There is a strain on both the teaching staff and the physical plant due to the increase in undergraduates from 200 only 15 years ago to 2,500 today. (See the Agricultural Institutions Annex).

ICARDA

Since the International Center for Agricultural Research in Dry Areas (ICARDA) started operations in 1977, its main research efforts in Syria have been centered on problems of cereal, legume and forage production, and on the development of an integrated farm system research . . program in semi-arid areas. Since ICARDA has responsibilities that include 19 countries stretching from Morocco in North Africa to Pakistan in the Middle East, its research efforts must be concerned with its entire geographic responsibilities rather than just within Syria.

Nonetheless, with its other centers in Lebanon and Iran delayed, ICARDA has focused its activities on an extensive building program near Aleppo. The research area and housing facilities being constructed at Tel Hadia will be comparable to almost any research center in the world. In 1978, there were over 180 staff members in ICARDA.

ACSAD

The Arab Center for Studies of Arid Zones and Dry Lands (ACSAD) has been a regional center since 1971 with headquarters at Douma. The staff of 40 is doing research related to water resources and utilization, soil classification and fertility, soil-water relationships and conservation, sheep pastures and range management.

FAO

The Food and Agriculture Organization (FAO) conducts a number of projects in Syria which mingle research and action programs. The Integrated Agricultural Development projects, located near Tartous and Hasakeh, are experimenting with the development and dissemination of new production techniques. Perhaps the most interesting experiment has involved the creation of "Hama" cooperatives in the steppe in order to help the Bedouin re-establish range management and control, and to stop the deterioration of the steppe which has become extremely serious in recent years.

Livestock Experimental Stations

Probably the most significant livestock research has dealt with Awassi sheep breeding and selection which was initiated through an agreement between the MAAR and the Arab Center for Studies of Arid Zones and Dry Lands, especially in the Hama Sheep Breeding Station. However, as previously noted, most research funds have been channeled to plant related research and little to livestock.

Forestry and Range Management Institute

The Arab League Forestry and Range Management Institute at Lattakia is oriented primarily toward educational activities and training in forestry and range management techniques. However, the needs and possibility for research exists and should be developed.

Cooperation Among Research Agencies

Since the bulk of present agricultural research is being conducted within the MAAR, the following comments pertain to the relations between the MAAR and the other agencies operating in the SAR.

Cooperation of the MAAR with international centers is primarily limited to ICARDA. This cooperation usually takes on either of two forms: (1) ICARDA providing varieties of seeds (i.e., chickpeas) to be planted and harvested by the experiment station personnel, and the results then presented to ICARDA; or (2) ICARDA personnel and equipment coming to the station and planting the experiment (usually wheat), then returning to harvest and provide the results to the experiment station.

International research centers provide corn seed and potato stocks for several agricultural experiment stations.

Cooperation with ACSAD appears to be still limited. The MAAR assigns certain lands areas to ACSAD whose technicians conduct experiments many times in isolation from national agencies. There seems to be good cooperation between ACSAD and the Directorate of Soils, Douma, however, in the project to map soils in Syria on a 1:250,000 scale. ACSAD is also heavily involved in range-oriented research work, such as work in determining fodder intercropping patterns, assessing the use of certain shrubs in range improvement, and improving the milk, meat and wool characteristics of the Awassi sheep. These activities involve cooperation with personnel from the agencies of the MAAR involved in animal husbandry and the use of land on the Al-Kirim and Wadi-al-Azid stations near Salamieh and Essyrieh, respectively.

Conclusions

Observations made during the visits to the agricultural experiment stations and to the agricultural centers indicated only a minimum of information exchange with farmers.

The experiment stations facilities, in general, are extremely limited. Most stations are in need of new field equipment. There is a lack of socio-economic research.

In addition to the Rakka and Ghab stations, the stations of Jellin, Homs and Hama are strategically located and have a land and infrastructure base which would allow them to be developed as regional research centers. Linking the research of these five regions to the production planning for the regions as a whole should improve both the quality of research and the quantity of production.

Salary differences seem to be one of the main obstacle to full cooperation between the College and Ministry. (The 200 percent salary increase at the universities several years ago predictably created some ill will).

1. To develop the overall research strategy for agriculture in Syria, it is necessary that the Agricultural Research Council resume an active role and that its composition be carefully considered. It is recommended that the Minister of Agriculture (or his representative) serve as chairman and committee members be selected from the various agencies dealing with agriculture. Members should also include the three Deans of the Faculties of Agriculture, the Director of the Research Directorate of the MAAR, the Director of the Soils Directorate of the MAAR, and representatives from FAO, ACSAD, and ICARDA.

2. Special efforts should be made to ensure that cooperative research develops between university and the Directorate of Research personnel as graduate programs increase at the universities. Salary differentials for people with equal training and experience must be narrowed if truly cooperative research is to be conducted.

3. Socio-economic research should be undertaken to complement agronomic and animal research, and as an aid in planning the development of the agricultural sector.

4. Agricultural experiment stations that are recommended for development as first class stations in order to serve on a regional basis, because they are strategically located and have a land base that would qualify them as regional research centers, are: (1) Rakka, (2) Ghab, (3) Jellin, (4) Homs and (5) Hama.

5. Detailed soil surveys must be completed on all agricultural experiment stations since research data must consider the soil type to be valid. A national soil survey is underway by the Directorate of Soils in cooperation with ACSAD and this should be encouraged.

6. Cooperative research with international centers, especially those headquartered in Syria, should be developed and maintained. If located in Syria, practical research problems for the Syrian farmer should be given priority.

7. Adequate housing for professionals should be provided for experimental stations that are not near to satisfactory housing.

8. Professionals who are interested in, and qualify for, graduate and post-doctorate training should be provided the opportunity.

9. Most experiment stations need improved and new equipment and facilities.

D. Agricultural Education

Examination of recent Syrian history reveals an extensive emphasis on popular education. Since independence very substantial resources have been allocated to education by Syrian authorities both to create and maintain a national system of education (pre-primary to university), and to extend educational opportunities to all segments of society.

This high priority given to education contrasts sharply with the pervasive neglect of education during previous historical periods.

Independence and Educational Growth

In the three decades following independence, education was assigned a central role in national development and many educational improvements have been achieved. A unified multi-level educational system was created. Educational enfranchisement was enlarged and extended to all age groups. Beginning education for the young was made compulsory. Nation-wide literacy became a major goal.

There are now three universities, one university-level higher institute, and approximately 25 two-year intermediate post-secondary institutes. In addition, there are over 60 other institutes and training schools, some of which function at a post-secondary level, and others that offer adult education, literacy, or specialized training programs.

In comparison to 736 students enrolled in universities in 1944-45, there were over 65,000 in 1975-76, and an estimated 94,000 in 1976-77. In addition, in 1974-75 nearly 30,000 students were enrolled in higher education programs abroad.

In the same year, there were 6,530 primary schools with 1,160,088 pupils, compared to 1,072 schools and 148,428 pupils in 1944-45. Similar figures for intermediate and secondary schools show only 64 schools and 11,592 students in 1944-45, compared to 1,022 schools and 415,816 students in 1974-75.

Formal agricultural education takes place in three types of institutions operating at distinct educational levels: a secondary level of vocational schools for training skilled and semi-skilled workers; a post-secondary two-year intermediate level for paraprofessionals and technician training; and higher education, at the university level, designed for the preparation of agricultural professionals.

Secondary Schools of Agriculture

The Ministry of Agriculture and Agrarain Reform (MAAR) is the agency responsible for providing training in agriculture at the secondary level. Toward this end it operates six agricultural schools, one technical veterinary school and one farm machinery school, see Table VI-4. Three new schools are in the process of being established, one a farm machinery school in Aleppo and the other two being technical veterinary schools in Hama and in Deir Ezzor.

Table VI-4. Secondary Schools of Agriculture, SAR, 1978-79.

Location	Year Founded	Number of Students			
		Year 1	Year 2	Year 3	Total
General Agriculture					
Salamiah	1910	102	16	42	160
Lattakia	1947	62	31	37	130
Deir Ezzor	1948	132	78	56	266
Dar'a	1960	22	0	13	35
Aleppo	1970	141	81	51	273
Harem	1970	45	47	43	135
Subtotal		504	253	242	999
Specialized					
Veterinary Damascus	1949	74	43	62	180
Agri. Machinery Himo	1969	40	28	29	97
Subtotal		114	71	92	277
Total		618	324	334	1,276

The curriculum of the six general schools is divided into three categories, the first being general cultural education (language, religion, physical and military education and national culture), the second containing the basic sciences (mathematics, chemistry, physics and biology) and the third the core technical courses. The curriculum is quite extensive and should produce good technical graduates.

The program, however, seems more like a general theoretical survey of agriculture than a curriculum designed to prepare for practical skilled work in the field. The number of different courses taught each year seems excessive. Consolidation, regrouping and pruning of courses seem to be in order and added stress given to practical problems involved in working with farmers and farmer organizations.

At the same time the program may represent the best possible, given the limited resources provided to the system. It is generally known that the schools lack the proper equipment, laboratories, farm and shop facilities and teaching aids necessary to establish and maintain a better teaching balance between theory and practice. Reconstruction of the curriculum would be enhanced by feed back from a working follow-up system with input from graduates and employers alike.

One noteworthy feature of the secondary schools of agriculture is that enrollment, in theory, is limited exclusively to children coming from farm families. Only the top two graduates of each of these schools may be admitted to a Syrian university. Other graduates, if qualified, may go on to two-year Intermediate Institutes. Children of farmers, like others wishing to pursue university education on Syria, must therefore avoid secondary (and the intermediate) schools of agriculture and follow some other track instead.

Students attending the agricultural secondary schools receive a monthly allowance during the entire year including the summer holidays. The cash amount varies depending upon whether dormitories and boarding facilities are provided by the school. The providing of housing or stipend for a substantial number of students helps solve a serious problem facing farm families who want to send their children to high school and have no relatives in town where the school is located or cannot afford the room and board.

The teaching staff at the six general schools is composed of 32 permanent teachers and 49 temporary ones who teach specialized technical courses. Salaries are standard MAAR rates defined for five different levels based on years of experience. The beginning teacher earns a monthly salary of SL. 730, which rises to 835, 1005, 1205 and 1590 for the other four grades. Each teacher is expected to spend 8 months (32 weeks) each year in class and one month in in-service training.

No educational agency has been given special responsibility for preparing the teaching staff required by secondary schools of agriculture, and there is a resultant shortage of qualified personnel. Normally teachers are recruited from among agricultural graduates of the universities. Because all of these agricultural engineers graduate with uniform training as generalists without academic specialties, with little practical experience in agriculture, and without special training or experience in teaching, new recruits are brought in by the ministry for special pre-service training sessions.

Besides the six general agricultural high schools, there are two specialized ones, one in the field of Veterinary in Damascus, and a second dealing with agricultural machinery in Himo near Kamishly in the Mohafazat of Al-Hasakeh.

As in the case of the General Agricultural High Schools, these two schools accept only students from farm families who have a middle school certificate and parental permission. All are accepted who apply and fulfil the requirements. No dormitory facilities are available at either schools, so the students receive the stipend of SL. 180 monthly to help defray their living expenses.

The curriculum at the two specialized schools is similar in structure to the General Agricultural High Schools, but with different technical courses so as to give the appropriate specialized training. In the Veterinary school, the third year offers even further specialization, with the students choosing between a focus on animal health, feeding and production and a second dealing more with breeding and laboratory techniques.

The teaching staff at the Veterinary Schools is composed of four permanent teachers, each with B.Sc. in general veterinary medicine from the Veterinary Medicine Faculty in Homs. There are 19 temporary teachers who work on a part-time basis and teach the specialized courses in the second and third years of study. The Agricultural Machinery School in Himo has four permanent teachers also and four part-time teachers for some of the technical courses.

Since 1976, 225 students have graduated from the Veterinary School, 92 from the Agricultural Machinery School, and 1,097 from the General Agricultural Schools for a total of 1,414 total graduates in the past three years. These graduates plus the 658 2nd and 3rd year students presently enrolled will mean that through the year 1980, there will be a total of approximately 2,000 graduates produced during the period covered by the Fourth Five Year Plan.

The Ministry of Agriculture does not have responsibility for placing the graduates of the secondary agricultural schools in jobs, and keeps no follow-up records on them. It is assumed, however, that few graduates enter active farming; most find jobs in government or agri-business where the returns are the highest. Many of the future graduates will doubtlessly be employed by the MAAR, as they have been in the past. In 1978, 1,148 of the 2,560 official (non-temporary) employees of the MAAR were graduates of secondary agricultural schools. Of the total secondary school graduates 1,044 were employed in Mohafazats Agricultural Departments, 21 in secondary schools, 9 on state farms, and 5 in various MAAR institutes outside Damascus. Only 18 were employed in the central MAAR office.

Projecting future employment opportunities for the Secondary Agricultural School graduates is difficult. One estimate predicate a shortage of 360 Secondary Veterinary School graduates by 1980. The MAAR estimates it will hire approximately 275 graduates of the Secondary Agricultural Schools by 1980. In addition, the new Extension plan calls for staffing of 156 centers over the next 10 years with as many as 100 more agricultural assistants by 1980.

Added to these requirements of the MAAR are the needs of other ministries, particularly the Ministry of Supply and Home Trade and the Ministry of Labor and Social Affairs. The total estimated needs through 1980 of all other ministries is 385 graduates. This yields a total public sector demand of approximately 100 people more than will be produced by these schools.

The continuing importance of agriculture in the Syrian economy would seem to call for more graduates in technical and vocational fields of agriculture rather than fewer. There is some indication that policy makers are leaning toward enhancing and enlarging the number of Intermediate Institutes in this field rather than the secondary schools. Such a development, should it occur, would distort still further the manpower ratio between professionals and technicians on the one hand and skilled workers on the other.

Perhaps the Intermediate Institutes of Agriculture in the long run can supply the shortfall, but it is apparent that the Agricultural Secondary Schools should be given the necessary resources in order to provide the technical field personnel which will be required in governmental programs in the near future.

Post Secondary Intermediate Institutes

The two-year Intermediate Institutes occupy a rung on the educational ladder at a level somewhere between the secondary schools and the universities. Their function generally is to offer programs to train substantial numbers of technicians and paraprofessionals. These mid-level workers are in critically short supply in Syria as in other developing economics. Ostensibly the Intermediate Institutes are terminal training schools whose graduates are barred entry to Syrian universities, and whose students may not transfer over to them. The main reason given for making the Institutes terminal in nature is that there is an immediate need for their graduates in the work force. The oldest of the Institutes was created in 1970. Facilities generally are old and ill-suited to present day needs, and staff are inadequately trained. Enrollments continue at a very low level, see Table VI-5.

Table VI-5. Intermediate Institutes, SAR, 1978-79

Location	Year Founded	Number of Students		
		Year 1	Year 2	Total
Aleppo	1971	258	101	359
Lattakia	1974	91	66	157
Damascus	1970	154	156	310
Rakka	1974	100	104	204
Aleppo (Farm Mach.)	1975	49	41	90
Total		652	468	1,120

The Intermediate Institutes are not part of a single system, nor are they administered by a single ministry. The Ministry of Higher Education controls the greatest number, followed by the Ministries of Education and of Industry. Various other ministries operate the remainder, each of which provides training in line with the needs of its sponsor.

Interestingly, it is the Ministry of Higher Education which is responsible for the Agricultural Institutes. These are closely associated with the universities in terms of location, staff, administration and facilities.

Neither the Directors of the Institutes nor the students themselves have a clear idea of what happens to students who graduate from the Institutes. Most do secure employment with the government, or in the agricultural sector with an estimated 80 percent finding work either in plant or animal production. Since all ministries have announced intention of hiring only a total of 80 Intermediate Institutes' graduates by 1980, there will be about 200 graduates looking for employment outside of government.

University-Level Agricultural Education

The three universities of the SAR are comprehensive, multi-disciplinary and multi-professional institutions of higher education. They comprise a single system of quasi-autonomous campuses operating under the jurisdiction of the Ministry of Higher Education (MOHE). Professional education in agriculture is offered at each of the universities through their respective campus Faculties of Agriculture, at Damascus, Lattakia and Aleppo. A fourth agricultural program, managed and staffed by the University of Aleppo, is offered in temporary quarters at Deir-Ezzor. A fifth institution for Veterinary Medicine is located in Homs.

These faculties teach a uniform curriculum with a prescribed course of study for each of the four years leading to a baccalaureate degree in agriculture, and the graduates receives the title of "Agricultural Engineer". No provision is made for the institutional diversification, or for specialization at the under-graduate level. Post-graduate programs leading to advanced degrees, which all faculties are encouraged to initiate, are beginning to emerge along lines of different agricultural specialists, in accordance with both the interests of requisite numbers of the students and the availability of staff and resources at each of the universities.

As the staff and facilities are put into place for teaching the approximately 7,000 undergraduate students in the Faculties of Agriculture, two additional teaching goals are being implemented, presently on a modest scale and eventually at a more significant level. The first is the training of graduate students in the Masters, and eventually, some Ph.D. programs. Some 25 students are presently studying for their diploma as prerequisite to their M.Sc. degree studies. One of the problems with this program has been the dearth of funds to get adequate faculty time devoted to it.

The second goal is a "training" function which has been defined in the Faculties, but as yet unimplemented as that of upgrading the technical skills of farmers and technicians who work in agricultural agencies in Syria. Of particular interest is the idea of "family extension" or home economics which would have women as its main focus. To date no funds exist for this purpose within the universities, though some steps have been taken (particularly at the University of Aleppo) to open the university's walls to the community, including the rural community.

Students gain admittance to the faculties of Agriculture on the basis of their scores on the Baccalaureate exam (scientific section) which is a country-wide examination taken by all high school graduates who wish to proceed with advanced study. Those who score high go into medicine, the next group going into engineering, and the third group into agriculture. The fourth group goes into general science.

The principal disadvantage of this system is that many students with little or no interest in agriculture and with no experience with rural life get assigned to agriculture as a lifetime career. Should they not want to enter the Faculty of Agriculture and should their scores on the exam not permit them to go into Medicine or Engineering, they can attempt to go abroad for their university education or they can go into one of the General Science specializations which rank below Agriculture in the examination hierarchy. However, due to the fact that the government guarantees employment to all graduate Agricultural Engineers, most of the students whose score within the prescribed range enter the Faculties of Agriculture regardless of their personnel interests or background.

In an effort to provide the trained teaching staff, which is needed to handle the dramatic increase in student enrollments in Syrian institutions of higher education in recent years, a Decree was issued in 1977 which raised the salaries of all university faculty to 200 percent of the standard public sector base salary rates. One objective of this Decree was to attract people with Ph.D.s into the universities, and this objective is at least partially being met. The three Faculties of Agriculture now employ 175 Ph.D. holders (or candidates).

Conclusions

The SARG has wisely assigned to popular education a central role in its development schemes for the nation. Systematically and repeatedly it has allocated substantial portions of its resources to the construction and expansion of an entire educational system comprising primary schools, secondary schools, and schools of vocational and technical education at both the secondary and post-secondary intermediate levels. Also it has created and staffed, as the capstone institutions of the system, three multi-purpose universities with responsibility for four faculties of agriculture.

In a space of a little over three decades of existence as an independent state, and in spite of political and military interruptions, Syria has laid down an impressive educational foundation upon which to "ensure the continued progress of the people and meet the needs of their continued social, economic and cultural development"

Efforts of the past will now need to be redoubled in the face of rapid population growth, rising educational expectations among the people, and the high illiteracy rates still prevailing.

In the agricultural sector productivity is steadily declining at a time when agriculture is depended upon to produce more food and fiber for a growing population, provide employment for an expanding rural work force, and generate exportable surpluses to support purchases abroad while maintaining a favorable balance of trade.

The best and most lasting change will be those which emerge from within the system rather than those attempted from without. The two central agencies needing most attention are (1) the ministries, which share responsibilities for education, and especially for vocational and technical education, and (2) the universities, which as the pinnacle institutions of learning, occupy a key position in the process of national development.

Responsibility for technical and vocational education is diffused among numerous ministries of the SARG. Taken together, their separate independent and autonomous efforts do not add up to an effective overall scheme for balancing manpower production training with national manpower needs. Unification of efforts is called for. This could be accomplished through transfer of responsibilities to a single ministry or agency. Alternatively, if transfer is not feasible, some coordinating mechanism can be created on an experimental basis, allowing for adjustments to be made from time to time in the light of developing experience. But articulation among the disparate parts is a prime necessity, however it is accomplished.

E. Agricultural Extension

Extension is an adult educational system that is designed to transmit research and practical information to the farmers and the public. Although in recent years the extension role of the Ministry of Agriculture and Agrarian Reform (MAAR) has been limited, agricultural technical information has been disseminated through many other organizations which are directly involved with farmers. These organizations include the cooperatives, Peasant Union, Rural Development Centers, the Ghab Project and State Farms.

Although its role has shifted from time to time as the other organizations were assigned responsibility for major parts of the extension function, the MAAR has continued to exercise considerable control over the type and amount of technical information distributed to farmers through the directors of the Mohafazat agricultural offices, and the chiefs of the Mantika and Nahia agricultural offices.

The MAAR's influence is exerted primarily through executive-to-executive ties. This structure permits program adaption to local conditions, but it also limits the communication flow within and between specialized areas of the MAAR. The proper balance between program flexibility and "efficiency" is a continuing dilemma, and the balance which is achieved will continue to affect communication processes within the MAAR and with farmer communities.

The New Extension Mandate

In December 1978, a Decree was issued creating a new Directorate of Extension in the MAAR. This new Directorate has as its primary responsibility the dissemination of new technology among the thousands of small private producers who constitute the bulk of the decision makers in Syrian agriculture. Field agents are now being trained and budgetary commitments clarified to launch a major extension effort again in the hands of the Ministry of Agriculture.

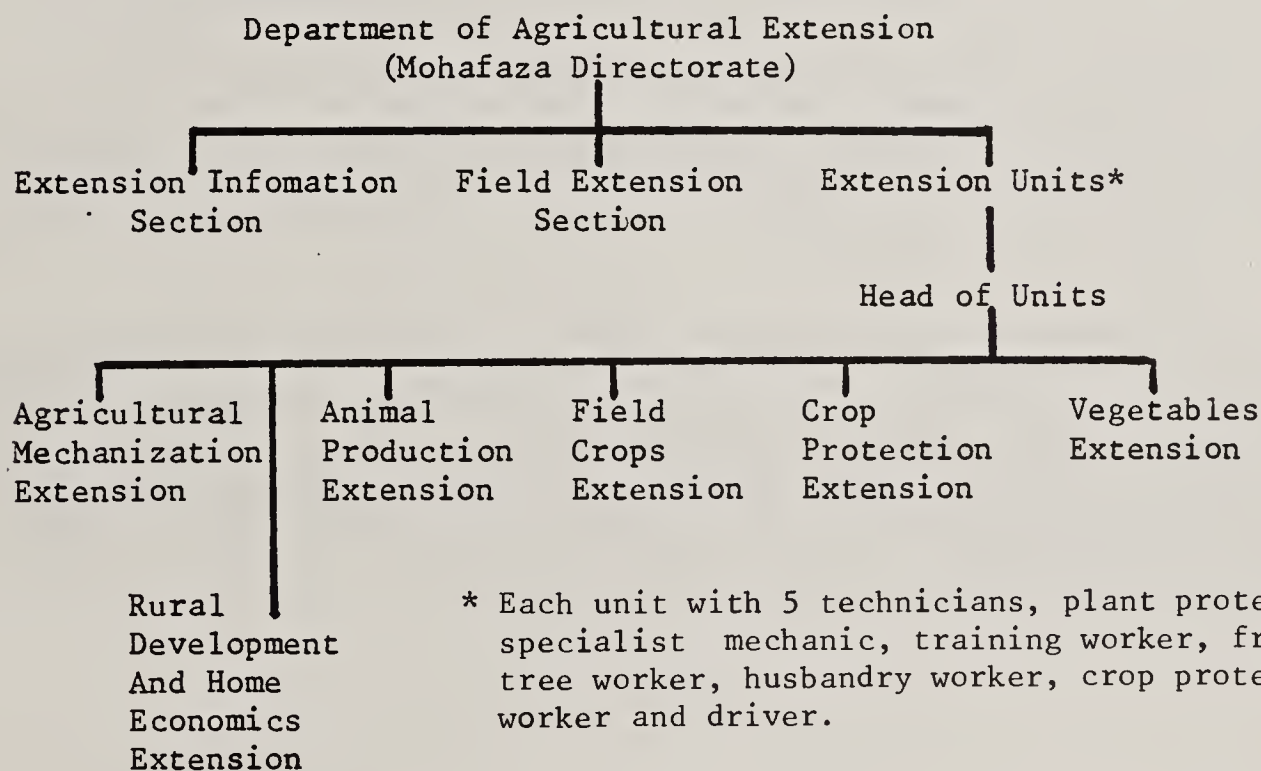
This new policy stresses gaining the trust of the farmer. This can only be achieved after communication is established, and will only be assured when the agricultural engineer becomes confident in his ability to perform the job and has useful knowledge to impart. This, too, is recognized in the new policy which discusses the need for strengthening agricultural programming. At the same time, the preference for cooperative production remains, but the primary emphasis is to increase agricultural production.

Expanded production is to be accomplished by emphasizing the following features in extension programming: (1) Regrouping of cropped land for improved mechanization; (2) Improvement in financing and distribution of inputs (and presumably education about this area); (3) Improvement in fertilizer usage and estimation of fertilizer needs; (4) Increased crop protection; (5) Improved programs in crop intensification and rotation; (6) Improved irrigation methods; (7) Improved drainage methods; (8) Acquainting farmers with new organizations related to agriculture; and (9) A broad program of rural development including an expansion of work in home economics.

Extension programs relating to crop production are to stress wheat, barley, yellow and white corn, cotton, fodder plants and legumes, sugar beets, potatoes, fruit trees and vegetables. Animal production, fishing and beekeeping will also be emphasized.

The program is to be organized to promote flexibility permitting expansion and adjustments as new personnel become available. It is expected that the role of the new extension organization during the first five years will be limited to training, programming, evaluation and supplying of supplementary media items. Field extension staff at the Mohafazat level will be part of the immediate program but Mantika staffs will not be added until capabilities increase probably during the second five year period. At the provincial level the proposed structure is as follows:

Proposed Extension Organization At Mohafazat Level



Implementation of the Mandate

The goals and general thrust of this new mandate are appropriate and worthy of being enacted but the program being proposed for implementation may well fall short of being able to deliver these goals. Although the program envisioned has been greatly increased in scope and size, it does not appear to represent any real change from policies tried in the past. For example, the structure of the new program stresses programming at the national and provincial levels where the tendencies always are to stress office work at the expense of field work. Contacts with farmers will probably be minimal, thus making it difficult for extension agents either to affect farmer's behavior or to learn about local conditions. Thus the programming of extension still appears to be conceived of as an instrument for carrying out national policies than for meeting local farmer needs. Knowledge is still something to be "deposited" and no interaction is envisioned. This is further evidenced by the emphasis put on cinema, publications and other "packaged" information sources. Use of these mechanisms tends to minimize actual contact time with farmers and often reflect conditions which may not be related specifically to local problems. This type of presentation again reflects a bias towards an educational outlook which merely deposits information and does not develop capabilities.

A second feature of the present system which seems destined for incorporation in the new program is the practice of channeling the flow of information between organizational levels through the executive offices at each level. The Head of Section for Extension at the Mohafazat level is supposed to communicate to the Extension Directorate only through the Mohafazat Agricultural Director. The Mohafazat Director will generally contact the National Extension Directorate through the Minister's office. It is then up to the Minister's office to contact the Extension Director who will allocate the problem to one of his staff. Thus no special office has a continuous structure throughout the MAAR chain of command. Each service, on each geographic level, represents a "cabinet office" to the executive in charge at that level, creating a discontinuity between levels of government and regions at the same level.

Even more striking is the great number of quasi-autonomous agencies which must utilize the MAAR as their only means of transmitting information to local offices and farmers. The General Organizations, for example, are only linked through the Minister's office to the Mohafazat offices, the Mantika offices and the farmers themselves. Likewise the farmers and representatives of the cooperatives, the Agricultural Cooperative Bank, the General Feed Organization, and the Peasant's Union are only inter-linked through the Mantika Head of Service.

Thus, a problem with a crop or production technique that is the concern of one of the General Organizations would have to be transmitted to the Minister's office and from there, for example, to the Plant Protection or one of the other MAAR Directorates.

On the other hand, a request for assistance in solving a technical problem within a certain Nahia would have to be called to the attention of the local agricultural engineer, who would then contact the Mantika Head of Service. If the Mantika Head thought the problem was important, he would contact the appropriate engineer in his office. If no solution could be found at that level, the problem goes to the Mohafazat Director of Agriculture, who in turn contacts the appropriate specialist at the mohafaza level. If he has no solution he can call Damascus by radio. The link at last is made with the man who had received the new technique from the General Organization's researcher's in the first place, and the solution is returned down the line to the farmer.

In this system, the linkages are present and the services are there, but as many farmers and local-level engineers noted, services often come too late to be of benefit.

Improved Flow of Information

In order to remedy this situation and speed the flow of information, it appears desirable that strong direct linkages be established between the specialized offices at various levels, both the programming (downward flow of information) and data collection or monitoring of program effects (upward flow of information).

Other ways in which the number of parallel channels could be increased is through giving more power to the General Organizations for doing their own extensions operations, or at least encouraging them to monitor the applications of their own research, and recommendations so that their programs can be modified to face the realities of applying programs in the field (as in the case of the Tobacco Monopoly).

In addition, the effectiveness of radio as a parallel channel of communications could be increased with a few minor modifications and little rise in cost. These are: include the MAAR among the agencies providing material for programs (along with the Peasant's Union and the Syndicate of Agricultural Engineers); and change the time of broadcasting from late afternoon to early evening to catch farmers after they return to their homes from their fields.

The Peasant's Union training programs could provide additional parallel channels for information diffusion. Their programs must be improved, however, both in terms of technical content and farmer incentives for participation. As long as farmers do not want to attend these programs they will have little effect. The program in repair and maintenance of agricultural vehicles demonstrate that increased technical relevance is often enough to increase course desirability without increased monetary incentives.

Finally, the Peasant's Union should begin to utilize the agricultural engineers on its staff in more field-level training programs, in addition to its present classroom-style programs. These can be instituted as follow-up programs in cooperatives that have recently sent farmers to attend classes in the institute center. By sending an engineer or technician back with the trainee, the Peasant's Union would lend support to him in helping to convince others to utilize new methods. The short visit of the engineer (perhaps for one week) would allow the trainee enough support so that he could begin to talk about what he has learned.

The basic problem of rural service in Syria, however, remains one of attitude. There is an emphasis on what has been called "narrow-spectrum" services, with "office-bound methods and symptomatic treatment." The question is one of whether extension should treat merely individual farm production problems or rural community problems as well.

The concept of using the agricultural engineers as rural development workers cooperating with rural population to obtain services and organize self-help village improvement programs should be further explored in Syria. Farmers interviewed appear to define many of their concerns in terms of infrastructures and social services: clinics, schools, lack of drinking water. Agricultural engineers see the problems still as merely a matter of bringing new technologies to local agriculture. The road between the two sets of concerns is a long one. The first step is to open the communication link between the two and then create the action agencies that can bring about an integrated change in rural life.

Practical Competence in Agriculture

The approach which ICARDA is making to the extension problem has certain features that might be incorporated into plans for the new MAAR extension program. The ICARDA program stresses increasing the practical competence of the agricultural engineer in general agriculture as a first step. Their training de-emphasizes the theoretical approach and stresses practical aspects of seed bed preparation, machinery usage, and so on. It is felt that as the engineers' competence is increased in this area, confidence is also increased and that they will be willing and able to interact more effectively with farmers. It is too early to judge their success, but the idea appears to have merit.

A necessary step towards increasing the practical competence of engineers is to improve the practical content of the general agricultural education and to provide in-service training to engineers already in the field. This would call for farmer and ministerial assistance in the initial phase of the program, in university curriculum development and in acquiring necessary equipment and instructors. In-service training for engineers already graduated would require a revitalization of the training section of the Extension Directorate, the development of a curriculum, purchase of equipment and training of a staff. All of these would require outside support.

Beyond stressing improvement in their competence in practical agriculture, the ICARDA program although to encourage engineers to:

1. Look at the sociological and economic characteristic of the community in which he works and utilize these in evaluating participation of farmers:
2. Experiment with local variations to determine the combination of practices and inputs that are best suited to local needs; and
3. Use these experiments both as a means for demonstrating new techniques, and for contacting farmers and getting their ideas on needed technological changes. The newly developed techniques themselves could be made more relevant to the farmers' needs through this mutual interaction. More important, however, is the fact that the engineer would have a more systematic approach toward understanding the farmers' need, while the farmer could learn something about the scientific approach toward problems.

The ICARDA techniques represent a first step. It is an improvement over the rather non-directed approach which appears to exist today. Although agricultural engineers satisfy the quotas of work set in the program, it is evident that they often have little interest in their work. The alternative approach suggested by ICARDA begins to point the way toward goals that would attract college-trained individuals toward occupations of national service and motivate them to work with farmers once they enter government service.

Rural Development Activities

Taking the next step, from a program to solve on-farm production problems to one of community development would require national support of a new type. Institutions like MAAR can not provide all of the services necessary for this approach. What is needed is to integrate services at regional levels and use the community worker to extend those services in the village themselves.

There are organizations already in existence which provide some of these features. These are:

Social Welfare Centers: Which provide multiple services within rural areas. Although the program is limited, it shows that coordination between ministries can take place for the purpose of local delivery of services.

Cooperatives: Provide a means for organizing farmers at a level beyond their family concerns and traditional alliances.

Peasant's Union: Represent many interests of farmers including their interest in improving the quality of rural life.

Ministry of the Euphrates: Shows how services can be integrated and coordinated on the basis of geography to serve local concerns. There is no reason why this geographic approach toward integration could not be repeated, even within smaller localities.

Each of these provide models for a larger integration of services which could in turn provide the institutional support necessary for the local-level community worker. The ICARDA model would be used merely as a bridge between old and the new, helping the agricultural engineer to change his patterns of understanding to suit the new requirements. Institutions building and modified training programs would provide new types of personnel to support the engineer as he takes the next step toward a larger role. This first step requires the opening of farmer-engineer communication and that is where the initial concentration of efforts must take place.

Conclusions

1. Location of Agricultural Engineers. Field level agricultural engineers serving extension functions should continue to serve as often as possible in their own home areas, especially in areas where there is relative ethnic homogeneity. The advantage of utilizing a member of a community as an "extension agent" to overcome the natural reticence of some communities toward contacts with the outside for outweighs the disadvantages of that practice. In heterogeneous areas, however, means would have to be found to assure normal interaction between engineers and other communities of which they are not a part.

2. Preparation and Training of Field Personnel. The training of agricultural engineers need to be significantly re-oriented toward stressing the practical aspects of agriculture. Having practical experience will increase the engineers' competence in the field and in turn raise their confidence, thus increasing their ability for interaction with farmers. Increased interaction between farmers and engineers (and their staffs) improves the climate for communication which in turn improves the climate for development.

Interviews with field personnel of the MAAR indicate that they are operating with one-third to one-half the number of agricultural engineers necessary for present programs. Therefore the number of engineers and supporting personnel need to be increased. However, since program effectiveness is not

not a merely a question of numbers, it is suggested that the first attention be given to up-grading the training of existing engineers with the number of new engineers being slowly increased as new and useful slots can be opened for them.

3. Field Contacts with Farmers. Programs such as the old (pre-1968) extension service, ICARDA, the Fruit Tree Production Program, the Tobacco Monopoly Program and the programs in the Ghab have been successful partially as a result of their high degree of contact with farmers. Any extension program must follow these examples if it is to be successful. Personal communication, demonstrations and interaction have been shown within the Syrian context to be highly effective as a means of information exchange. Pamphlets, films, broadcasts, etc., can inform the farmer, but personal contact with trusted innovators and village leaders is a minimum necessity for actual changes in farming techniques to take place. The practice of having agricultural engineers and technicians serve in their own communities coupled with improved training of those engineers would increase the acceptance of these individuals. Stress in extension must continue to be laid at the field level rather than on a sophisticated media-oriented directorate.

4. Use Multiple Communication Channels. The executive level offices of the MAAR are apparently over-utilized for transmitting agricultural information between levels and between departments in the agricultural sphere. There tends to exist serious communication overload at certain administrative points in the system.

More channels of communication must be established between different levels of special purpose directorates within the MAAR. Also offices outside the MAAR, such as General Organizations, The Peasants' Union and cooperatives must maintain their own parallel linkages to farmers. These will both increase the chances of messages getting through and permit organizations to monitor their own effects by increasing two-way communication. But, the communication delivery of other organizations should be coordinated with the extensive program of the MAAR.

5. Decentralization and Adaptation of Programs. Although the independence of the Agricultural Director at the Mohafazat level indicates a potential for decentralization of agricultural programming, analyses of the licensing procedure, the extension directorate and other special programs of the MAAR show a heavy reliance on centrally planned programs and input recommendations which often do not sufficiently take into account local conditions. Local geographic conditions must be used to modify even the best centrally planned programs if such programs are to succeed on the local level.

6. Extension as a Specialized Function. The recent decision to create a special organization for extension within the MAAR is to be highly commended. Attempts by special organizations to organize their own extension services have failed to achieve significant results, at least in part because they necessitate great manpower requirements and they lower the efficiency of specialists in delivering services by giving them higher workloads not specifically relevant to their talents. Properly organized, an "extension service" could take localized problems into account, while concentrating on the specialized problem of information exchange.

7. Socio-Economic Research and Planning. It appears that both the Euphrates Project and to a certain extent the Ghab Project have attempted to use socio-economic research in developing farming systems as a component of their planning process with feedback at every stage on the effects of the programs. This kind of practice needs to be encouraged in other projects as well, both in planning and in monitoring the effects of projects. This can be facilitated by encouraging socio-economic research programs in the universities and linking the gathering of data to the planning process.

F. Agricultural Economics Analysis

The need for continuing assessment of the agricultural sector was recognized during the planning stage of the current project and the team was directed to make recommendations for future work relating to sector analyses and planning activities. Particular attention was to be given to identification of improvements in the quantity, quality and accessibility of data and to the planning process including areas for continued or added analysis and staffing requirements.

Implementation of the full recommendations will be a long-term process but a program could be undertaken which in the short run would provide assistance in developing annual plans and in the long-run provide a sound basis for developing the Sixth Five Year Plan.

Data Bank and Analytical Staff

The extent and quality of data relating to the agricultural sector in Syria exceeds that available in most other developing countries and compares favorably with that in many developed countries. However, it is clear there is still need for additional data on many facets of the sector and for improvement in the accuracy and consistency of existing series.

As a part of the assessment, a significant mass of secondary data was assembled from various sources. These data have been incorporated into computerized data systems in the US by technicians participating in the assessment or in Rome by FAO. These systems include data on area, production, and yield for all major crops at the mohafaza and mantika levels for the 1968-77 period; natural resources inventory information; landsat data on land use;

input and commodity prices; and sectoral input-output data including disaggregation of the agricultural sector into major subsectors. In addition to the assembly of secondary data, a mass of new data was developed on village characteristics, and on-farm production practices, costs and returns covering a large nationwide sample of villages and individual holders. All of these computerized data, together with the computer programs developed for their storage and processing, need to be transferred to Syria and established as the basis for an agricultural data bank. Personnel need to be familiarized with the data and trained in the use of programs for collecting, assessing, analyzing, and summarizing the data. Arrangements should be made for incorporating new data into the system as these data become available. Finally plans should be made for improving the dependability and consistency of existing series and for filling gaps.

The assessment also made apparent inadequacies in support staff to interpret, analyse and summarize economic data in a form suitable for use by decision makers. This need could continue to be met through the use of foreign specialists obtained under agreement with foreign governments or international organizations.

This expedient might be reasonably satisfactory if the specialists included a judicious mix of long-term specialists to provide continuity and short-term specialists to supplement resident staff in performing specialized analyses. However, such foreign specialists will never have the in-depth knowledge needed for the most effective analyses. Nor can it be expected that foreign specialists will have the same deep interest or commitment to Syrian development as career specialists who are Syrian citizens. Development of an adequately trained staff is a long-term activity. It might be necessary therefore to utilize foreign specialists in the short-run to work with the Syrian staff in developing information that will be needed to formulate annual plans and continue to build the information base essential for development of the Sixth Five-Year Plan. In any case, steps should be initiated as soon as possible to recruit, train, and organize a supporting analytical staff. This effort should proceed simultaneously with efforts to improve the data base. The two activities complement each other and, in fact, one can not be accomplished effectively without the other.

The following sections will outline the functions of an Agricultural Economics Analysis Staff, identify the major data needs, suggest the types of economic analysis most useful to support the planning function, and indicate the number and training of staff required.

Staff Functions

The primary function of the proposed staff would be to provide socio-economic information on the agricultural sector for national and regional planning purposes in both the public and private sectors. The basic objective of such planning is to establish the best uses of natural, human, and other resources on individual farms, within each region, and throughout the nation.

Such use must be consistent with stated public policies and goals. Attainment of the planning objectives will require that attention be given not only to attaining optimum resource use on farms but also by all public agencies and private firms involved in transporting, storing, processing or merchandising agricultural products or in providing credit, supplies, or resources to farm operators.

Past and probable future trends in population, income, and consumer buying habits which will affect domestic consumption will need to be analyzed. Levels of living of rural people and migration to and from rural areas will have to be studied since these factors will affect not only the number and quality of farm workers in the future but also the attainment of stated policy goals not directly related to agriculture. Finally, attention must be given to organizing and integrating these farm and off-farm operations in such a way as to achieve maximum efficiency in producing and distributing each commodity or combination of commodities for each region and for the nation. The scope of work of the staff group, therefore, must encompass all socio-economic aspects of agricultural sector development. Failure to include any one of the segments involved in growing or moving products from farm to consumers may lead to erroneous evaluation and ineffective planning.

How the staff will carry out its assignment will depend to a considerable extent on where it is placed in the SARG organizational structure. Either the Ministry of Agriculture and Agrarian Reform or the State Planning Commission appear to be logical locations. However, since the work of the staff must be concerned with the entire agro-business complex, it will have to consider many programs that are beyond the area of responsibility assigned to MARR. Moreover, the staff will be dependent on information generated by many other Ministries and agencies. It appears, therefore, that the State Planning Commission with overall responsibility for the planning process would be the preferable location for the agricultural economics analytical staff. The staff might be established as a group within the existing Agricultural and Water Resources Planning Department or organized as a support unit reporting to the Deputy Minister directly responsible for planning work.

Since the staff's primary responsibility is to provide economic information to decision makers, it is assumed that it will function solely as an analytical group. It will not be responsible for making policy or program decisions, although it will provide information on the probable results of alternative proposals to decision makers at National or regional levels. For example, if a question on price policy for a particular commodity is being considered, the analysis should provide estimates of the effect of alternative prices on volumes produced, costs and returns to farmers, the demand and costs for marketing facilities and services, and if combined with data for other sectors, on employment and national income.

The results, if the analysis has been adequately developed, will provide quantitative measures of the relative economic benefits and costs of alternatives considered. Government officials can then consider the economic along with the social, political, or other implications and make a more rational choice among alternatives. On the other hand, if the staff is to serve as a useful planning tool, it must have recommendations or instructions from the Ministers or the Agricultural Council as to what information will be needed.

The proposed staff would not have the primary responsibility for collection and the basic processing of data. They should, however, be assigned responsibility for advising with all Ministry or organization representatives having direct responsibility for data collection and for determining through appropriate government channels the plans and procedures for collecting, assembling and summarizing information. The staff would need to recognize that each organization needs certain types of information to guide its operations but aside from providing technical assistance, the staff would have no responsibility for generating such information. On the other hand, unless this staff is able to determine the data to be collected for sectoral planning and the methods to be used in its assembly, it cannot carry out its assigned function.

It is further assumed that the staff will not be involved in carrying out any regulatory, promotional, or noneconomic research activities. Involvement in such activities would dilute the staff's efforts to move forward with its assigned program, and might also make it impossible for it to take an impartial position in evaluating ongoing programs.

Economic Information Needed

Planning objectives at both the micro (individual farm or establishment) and the macro (regional or national) levels are similar. Both are concerned with optimizing resource use, although measures of optimization may differ. An individual farmer might consider a plan to be optimal if it maximizes income from his farm, taking into account the opportunity cost of his family labor. A national planning unit, however, would be concerned not only with maximizing farm income but also with determining the impacts of maximization on levels and distribution of incomes among and within non-farm groups, on foreign exchange balances and other considerations.

In addition to different measures of optimization, the analytical procedures, levels of aggregation and methods of presentation of data will differ at the two levels. Nevertheless, much of the basic data required for analyses at one level will be required for the other, so that the collection and summarization of all data should be coordinated.

Micro Level Data

At the farm level, private farmers and public extension or credit agency representatives developing detailed farm plans need information for each major crop in each production region. Such information includes measures of the combined effects on per-unit costs and returns of planting different varieties, applying different types and amounts of fertilizer, using different types of equipment, and applying different cultural and harvesting methods. Similar information on input, cost and returns relationships is needed for livestock enterprises. Price information will be required in calculating the most profitable levels of production. Price information should include current and projected prices for inputs and outputs and measures of the effects of varying volumes on prices received.

Data of the type collected from individual holders in the farm survey made as part of the current agricultural sector assessment will meet most of the needs for information on input/output relationships at the farm level. Data already collected provide a good start toward meeting data needs in this area. Different relationships will evolve over time as a result of weather variations, in response to changes in relative prices or, because of adoption of new technologies. Therefore there is need for continuation of the survey, but with modifications to provide better coverage and improve the accuracy of the data. The survey data obtained from individual farmers should be supplemented by systematic collection of information on input-output relationships from experimental and demonstration plots. Studies of the extent and potentials of soil and water resource development underway or to be implemented in the near future will also provide useful supplementary information.

Historical price data appear to be reasonably adequate and accurate for inputs of commodities moving through public agencies, although additional information on price/quality differentials would be desirable. Price reports for inputs and commodities moving through the private sector are generally nonexistent or inadequate. Improvements of these data should be given moderately high priority. A more urgent need is for projections of future foreign and domestic prices. While needed for micro-level planning, the development of such projections would be a part of the macro-level system.

Also at the micro-level, public agencies and private firms engaged in providing marketing services require information on effects on costs of type, size and location of facilities and of different combinations and volumes of business. Annual reports of SARG organizations provide considerable information on the operation of public sector facilities. The program initiated in the State Planning Commission in 1979 to standardize reporting procedures for all organizations will make these reports more useful. However, more detailed information on individual establishments operated by each organization is needed to develop measures of relative productivity and identify steps to be taken to increase efficiency. Detailed engineering

studies of individual functions will be needed in some plants to supplement reported information. Similar data should be developed for the private sector but would be more difficult and costly to develop and of less importance than for the public sector.

Macro-Level Data

At the macro-level, data are needed on prices at all stages in the marketing chain--farm, wholesale and retail. Such data are the basis for measures of marketing margins or spreads which can be compared with estimates of costs derived through aggregation of micro level marketing cost data described above. Such comparisons will indicate if prices are too high, too low, or about in line with the costs of services rendered. Considerable price data are available for farm and wholesale levels for the major commodities handled by the public sector. Information on domestic and imported commodities moving through the private sector is spotty and of questionable accuracy. All price data should be related to specific qualities of commodities to which they apply.

Descriptive information on marketing facilities, channels, practices, and structure is needed to supplement the cost and price information. Taken together with information on market spreads and costs, such information would be useful in identifying marketing constraints to expanded production and in determining changes necessary to eliminate the constraints and improve efficiency. Information of this type is readily obtainable for the public sector but very limited and more difficult to obtain for the private sector. Information has been assembled and evaluated for most of the major agricultural products as a part of the agricultural sector assessment, but no arrangement exists for systematic future collection of such data.

Data on price changes over time and on related changes in quantities marketed are also needed. Data are needed for both inputs and farm commodities and, for the latter, at both farm and retail levels. Measures of these related changes are essential for calculating demand and supply price elasticities needed for estimating the probable response of producers and consumers to proposed price changes. Or conversely, for estimating changes in prices necessary to achieve desired changes in production or consumption. Historical data have been used to analyze farmers' response to price changes as a part of the current assessment. However, for many crops, analyses failed to show significant relationships either because no relationship exists or because the relationship was masked by variables not incorporated in the analyses. More detailed data at lower levels of aggregation and further analyses are needed. Similarly, data are needed on consumer

response to price changes. Data relating to consumer responses are sparse and little or no analytical work has been done. Data for this purpose should be collected in each major consumer market and at frequent intervals. Collections of such data will be difficult and costly. However, measures of price elasticity will become increasingly important as government organizations expand processing and marketing activities.

In addition to the information on consumers' response to price changes that is usually developed from historical data, information will be required on the effects of changes in income and consumer preferences on quantities of individual commodities consumed. Measures of income effects are usually developed from cross-sectional data derived from a sample survey of individual households stratified into income groups. The recently initiated health/nutritional survey might provide, or be modified to provide, the necessary information. In the absence of detailed household expenditure data, useful clues to income effects might be derived from changes in consumption of individual commodities as reflected in the several food balance sheets currently being developed in Syria and changes in per capita income. However such data would have to be adjusted for effects of changes over time in prices, wastage, and other variables. This approach does not appear too promising in view of present data series; if collection of individual household data is not feasible, it would probably be necessary to continue use of FAO or other regional estimates of income elasticity.

Data on past and projected levels of national income and on sectoral input/output relationships will be needed by the staff for projecting future demands for agricultural inputs and products. Data of this type are readily available although accuracy and coverage could be improved.

The assessment specialists have already worked with the MAAR, CBS and Central Bank representatives in disaggregating agricultural sector data into major subsectors. The staff should continue cooperating with these groups to gather details and refine the data, but no major effort to develop new data appears necessary.

Finally at the macro-level, extensive data will be needed on human resources both those resources directly involved in agriculture and those influencing the demand for agricultural products. Needed information includes information on past and probable future trends in population, its movements and its composition; on the availability, quality and use of farm and rural labor; and on size of farm, type of tenure of farm operators, their incomes and social services available to them.

Analytical Programs

The preceding sections, which have sketched the primary purpose of the analytical staff and its informational requirements, indicate the major elements which must be provided for in the analytical program. Outlined below is a long-range program which can be developed in coordinated stages. It is not intended to be exhaustive but does include those elements which appear to be particularly pertinent at the present time. Some elements of the analysis might be done in other organizations but should be under the direction of the Agricultural Economics Analysis Staff. Development of the research program will be facilitated if the elements of the program which serve a common purpose and which require a common or a similar research methodology can be grouped together. The following program groupings are suggested for consideration in establishing the organizational structure of the staff.

Cost and Efficiency Analysis

The main purpose of work in this area will be the establishment of guidelines for increasing the operating efficiency of individual farms and marketing organizations. While the analysis will be at the micro or intra-firm level, the data developed will be the primary basis for analysis at regional or national (macro) level. The specific segments of this part of the analytical program are outlined below:

A. Delineate Uniform Resource Planning Units and Type-of-Farming Areas. As a basis for developing recommendations as to the most profitable farming plans, all agricultural lands should be subdivided into areas that have relatively uniform soil, climate, and other environmental conditions. Such delineation (referred to as resource planning units) was made by the assessment team on the basis of what was judged to be pertinent information available at the time. However, work has been, or shortly will be, initiated to develop more complete and detailed information on soils, water and plant life zones.

The assessment team also grouped the resource planning units into regional type-of-farming areas to facilitate summarization of data and its use in planning purposes. These regional grouping were based on judgemental decisions which reflected reported mantika data on production enterprises, reconnaissance survey reports of farm management specialists, and the intimate knowledge of Syrian counterparts. The groupings appear reasonable and adequate. However, type-of-farming areas may be expected to change over time as price changes bring about new crop and livestock production patterns; as new technologies are adopted; or new policy goals may dictate. Also, changes in planning requirements may indicate a need for a different grouping involving a greater or lesser degree of aggregation of resource planning units. Type-of-farming area delineation as well as delineations of resource planning units should therefore be periodically reviewed and modified as new information becomes available or changing needs dictate.

B. Develop measures of production responses to varying inputs and cultural practices. Arrangements should be made at the earliest possible date with the Agricultural Scientific Research Department of MAAR to incorporate into the design of experimental plot work adequate tests of the series of variables necessary for economic analysis. The tests located in each major type-of-farming regions should provide measures of the effects, individually and in combination, of such variables as crop variety, amounts and timing of application of fertilizer and water, and other significant cultural and harvesting methods. The tests should include sufficiently wide ranges in each variables to determine the maximum economic application.

The tests also should include sufficient replications to permit testing for statistical significance. Development of the designs will be a complex and difficult task requiring the assistance of a highly skilled statistician or biometrician, perhaps by an outside consultant until such skills can be developed in MAAR or CBS.

Concurrently with development of the experimental plot work, arrangements should be made to develop some coordinated tests on demonstration plots in each type-of-farming area. Demonstration plot results for a few benchmark points selected from within the experimental plot design will support results from the experimental work and also provide a measure of the relationship of experimental and commercial farming results.

C. Conduct on-farm cost and return studies. Continue to collect data on crop and livestock enterprises at frequent intervals from samples of farmers in each type-of-farming area on amounts and costs of inputs for each function and for each enterprise and on amounts of product sold and prices received for each commodity. A base for this phase of the program has been provided by the village and holder surveys undertaken as a part of the current assessment. The major items from the survey have been summarized and are a part of the report of the assessment team. All of the tabulations and data tapes are available in Syria and can be used to answer many questions likely to arise in the future regarding the cost, production practices, or farm organization for a specific village or group of villages. Arrangements should be completed for the transfer of the FAO farm management computer programs and for their installation on the new CBS computer facility. Arrangements should also be made to secure and install the Statistical Package for the Social Sciences (SPSS). These systems will be needed for any future analyses. The SPSS system could also be used in analyzing data on population, labor, and other topics of concern to social scientists.

Before new surveys are undertaken, a new scientifically designed area sample frame should be developed. A survey based on a sample designed in this fashion permits rapid, statistically reliable expansion of relatively

small samples to regional and national totals. Development of such a frame will require considerable time; arrangements for its development should be made very soon if it is to be ready for use in future surveys.

Before a new survey is made, the questionnaire used on the first survey should be revised or a new questionnaire developed. It should be shortened and simplified so that interview time would be reduced and accuracy improved. The revised questionnaire should be thoroughly field tested, including tabulation and summarization of the results, before it is used in the survey.

Aggregation and analysis of the farm management data by analysts working at the macro level will provide a basis for calculating nationwide supply or cost curves as well as information on the present status of technological adoption and the effects of variation in land productivity and managerial ability. The data also will supplement the data obtained on responses through the experimental work, particularly in regard to labor and machinery requirements.

D. Develop farm plans to maximize profits. Develop recommendations on the most profitable practices and combinations of enterprises for typical farms in each type-of-farming area. Recommendations should specify input requirements and estimate impacts on farm income of each area if the optimum farm plans were adopted. Data developed under B. and C. above can be used to synthesize current cost and return estimates for establishing most profitable combinations. Price projections to be developed by the demand and price analysts might be used in estimating future plans. Detailed descriptions of procedures followed, together with the basic data used in the analysis, should be provided local representatives of the Agricultural Co-operative Bank, Peasants' Union, and MAAR, to enable them to adjust recommendations to individual farm situations. Recommendations will need to be continuously updated as new technologies evolve and new response data become available.

E. Develop cost data for handling, storing, transporting, and processing farm commodities. Review available feasibility and engineering studies and assemble data on construction and equipment specifications and input requirements for operation of various sizes and types of facilities. If existing studies do not provide estimates of cost of operation, such estimates will need to be developed using costs of input data from surveys described below or from secondary sources.

Conduct cost surveys of marketing organizations or firms as necessary to provide industrywide information or to supplement secondary engineering or cost data. Develop cost estimates for each function in the marketing chain for each major commodity or group and identify areas in the marketing system where steps might be taken to reduce costs and increase efficiency.

Synthesize cost estimates for most efficient performance of each marketing function required to move existing or projected supplies of agricultural products to consumers as guides for marketing agencies in increasing efficiency.

Human Resources

Human resource analysts will be responsible for the assembly and analysis of social science data needed in planning for the agricultural sector. Most of these data will be secondary data already being collected as a part of the existing statistical program for which the Central Bureau of Statistics has overall responsibility. However, the Human Resources analysts would be responsible for working with CBS and other involved agencies in improving the accuracy and reliability of existing series and in assuring that the data are in a suitable form. They would also be responsible, along with other members of the staff group, for cooperating with other agencies in planning and carrying out new surveys to fill data gaps relating particularly to levels of living in rural areas, consumption patterns and nutritional requirements, and farmers' acceptance of change.

Much of the output of this group would be used directly in planning programs where changes in farmers' practices and attitudes are involved or programs specifically designed to provide social services in rural areas. In addition, they would be responsible for assembling and providing other staff groups information on trends and projections of population, migration, and labor supplies necessary for the analyses to be done by these other staff groups. Activities of the group might be organized under two broad headings.

A. Assemble, evaluate and interpret information on population and manpower movements. Information is being developed and projections made relative to natural rates of increase, fertility and morality rates, migration within and to and from Syria, labor force and employment. However, the data on which the projections are based are often old or, in many instances, very inadequate. Also projections relating to human resources generally are based on assumption of relationships among variables that have little quantitative basis. The projections, therefore, are subject to more than usual probable error. They should be re-evaluated to assess their probability and possible impacts of error. Also, the underlying factors affecting the projections should be continuously monitored throughout the period of the projection to determine if the assumptions as to variable relationships are correct. Revisions of projections will be needed if the monitoring process indicates changes in relationships or if new significant variables emerge. These population projections will, of course, be used directly in planning but also will provide the basis of projections by other members of the staff of demand for farm products and for farm inputs.

B. Develop information on rural levels of living and evaluate impacts of changes. A considerable quantity of detailed information collected on social services in rural areas is available only in very aggregate form and has not been analyzed as to its relationship to agricultural development. Such analysis would be a major function of this group. Supplemental information would need to be collected through special surveys to determine the effects of services on the health, nutrition and general welfare of farm and other rural people. Such surveys could also be used to obtain information on factors affecting farmers' decisions and acceptance of new farming practices, on shifts in production patterns or on other changes necessary for better utilization of natural resources and expanded production. While the Ministry of Labor and Social Affairs or other ministries might have the primary responsibility for conducting surveys of the type described, the Human Resource analysts must play a leading role in coordinating such activities and assuring that planning, collection and summarization of the data provides information that can be analyzed and used in the planning process.

Demand and Price Analysis

Demand and price analysts will assemble and analyze price and quantity data collected at farm, wholesale, and retail levels. Their primary function will be to provide: (1) information on prices prevailing over time in different locations; (2) measures of the effects of such factors as volumes sold, income levels, government regulations, and market structures on prices and price spread; and (3) short-/and long-run supply and demand projections for agricultural products. Responsibilities of these analysts may be grouped into the following categories:

A. Assemble and analyze price data. Analyze available data to establish trends, seasonal movements, and locational differentials. In cooperation with other agencies, as appropriate, plan for and collect primary data, particularly at the farm level, to supplement data already available.

B. Conduct studies of market structures. Develop information, quantified to the extent possible, on marketing channels, organizations and practices, and relate changes in these items to changes in relative prices and price spreads. Such information will permit marketing structure problems to be considered in evaluating alternative policies or development plans.

C. Calculate marketing spreads. Develop measures of spreads between farm, wholesale, and retail or export prices and relate these spreads to costs of performing the marketing function between each level and to prevailing type of marketing organization and competition. The comparative studies of costs and spreads will provide guides to needed adjustment in prices or increased competitions for different levels for each major commodity. Alternatives for improvement should be proposed.

D. Analyze producers' response to changes in prices, weather conditions or other variables affecting areas planted and yields. Work undertaken as a part of the agricultural sector assessment project generally has not yielded significant results on farmers' responses. It is desirable, however, to extend this analysis using other techniques for measuring effects of price changes and, if village level data can be developed, exploring weather effects in more detail.

E. Conduct detailed studies of factors affecting prices and quantities consumed. Develop analytical studies of prices and calculate measures of income and price elasticities for major agricultural commodities in domestic and important foreign markets.

F. Develop projections of future demands for farm products and inputs. Make demand projections for all farm commodities utilizing measures of elasticities described in item E above, population projections developed by the Human Resource analysts, and income projections for the national economy developed in other Ministries. This will involve continuing and expanding the projection work initiated under the present assessment project.

Aggregate Analysis

Analysts in this area will be responsible for bringing together the results of studies from the three analysis groups discussed above for the purpose of: (1) making overall plans for the development of the nation, specific regions, or subsectors; (2) evaluating progress on ongoing programs and assigning priorities to new agricultural proposals; and (3) providing other SARG agencies with economic information needed in their operations.

A. Develop specifications for optimum production-marketing systems for each major commodity. Synthesize from the data developed for increasing the efficiency of individual farm and marketing firm operations, the combination of types and sizes of business, locations and operating practices that will minimize the total cost and final price to consumers. A first necessity, of course, is the development of the micro input-output and cost data relating to the production and marketing of the major commodities. Beyond this, however, is the difficult task of modifying and creating analytical techniques for aggregating the micro-level data and establishing optimum organization of functions. Work should be initiated at the earliest possible date, in cooperation with the data processing unit and the director of CBS Computer Center, to develop adequate quantitative analytical methods and to synthesize optimum systems.

B. Develop plans for optimum use of resource. Further aggregate results of studies of optimum marketing and farming systems to provide information necessary for describing the optimum use of all agricultural resources of a region and, finally, for the entire nation. These latter

stages of aggregation and integration may be achieved through expansion of the models developed for determining optimum systems, but some additional models undoubtedly will be required for evaluation of ongoing or proposed programs.

C. Refine input-output data for detailed subsector analysis and for inclusion in national tables. In cooperation with the Central Bureau of Statistics and with other Ministries prepare input-output data at as low a level of disaggregation of the agricultural sector as possible and develop procedures for utilizing the input-output techniques for analyzing alternative policy proposals. The technique can be used in projecting change in the agro-business and other sectors likely to result from such policy decisions as injection of capital in developing a region, relaxing or imposing import restrictions, and a wide range of other policy questions. The more detailed and refined data, along with analytical procedures developed from such work, would contribute substantially to improvement of the national analyses.

D. Develop recommendations to facilitate attainment of optimum resource use. Relate present uses and attainments to optimum uses to determine rates of progress and adjustments and inputs required to attain optimum.

Survey and Statistical Work

In addition to the analytical groups discussed above, there is need for a survey and statistical unit to assist the analytical staff and the planning and statistical groups in other Ministries in developing, maintaining and utilizing an Agricultural Sector Information System. The group should include one or two well-trained statistical specialists knowledgeable in the use of computerized data and carrying out farm and household surveys. It should also include a small groups of experienced statistical clerks capable of assembling and summarizing data in a format suitable for use by the analysts. The specific tasks to be performed by this group are:

A. Participate in developing an Agricultural Sector Information System. In cooperation with the analytical staff and with other statistical agencies of the government, the statistical specialists should assemble all currently available data relating to the agricultural sector and incorporate these data into a computerized data file in the Central Bureau of Statistics. The file should include all the data assembled and placed on tapes by the Agricultural Sector Assessment groups together with the programs for retrieving and analyzing or summarizing the data. Also to be incorporated would be the regularly published statistical series used in the assessment but not yet incorporated in the computerized systems. Although these data will continue to be available in the published reports, inclusion in the data file would greatly facilitate historical analyses and the preparation and

incorporation of new data. New data will include not only the regularly published series but results of special studies such as more precise information on natural resources that will be developed from the land classification and ecological zone studies and on human resources that will be developed from the nutritional, household and census follow-up surveys. It is expected that separate data files will be developed for series relating to non-agricultural sectors or the general economy. Since some of the data from these files will be essential for analyses of the agricultural sector, the statistical specialist would need to be familiar with types of data included and with procedures followed in their collection.

B. Retrieval of data required for analyses of the agricultural sector.

Computer programs available to the new computer center of CBS are expected to include a report-writer subsystem. Therefore, the data can be retrieved directly in a form suitable for analytical use. However, some of the data will be available only in a form that will require hand listing and assembly into summary tables. In any case, the statistical group would have to secure the data and, working closely with the analysts, assemble it in appropriate format.

C. Assist in sample design. Since complete enumeration of all farms, households or other populations being studied generally is not feasible or necessary, a statistical sampling system must be developed. Assistance of outside sampling specialists would be required. However, the topographic and land use maps, aerial photography and remote sensing imagery required for this work are already available in Syria or will become available when the currently planned remote sensing center is established. The statistical specialist should work closely with foreign consultants and with Syrian statistical agencies in developing the sample frame.

D. Assist in questionnaire design. The staff analysts and statistical specialists in CBS, MAAR, or other government agencies will specify the information required in each survey. Computer specialists will specify the procedures and format required for entering the survey results into the Information System. It will be the responsibility of the statistical specialists to work with both groups to assure that the questionnaire design will meet both sets of requirements.

E. Assist in planning and carrying out surveys. Surveys generally will be conducted by personnel from CBS, MAAR or other agencies. Statistical personnel will be responsible for assuring timely scheduling of activities, adequate training of enumerators and appropriate procedures for editing and tabulating results for computerization.

Staffing and Training

Development of an adequately trained staff of Syrian analysts will require at least five years. In the meantime, the analytical program should be initiated in order to continue accumulation of the information and analyses needed in the annual review and modification of the Fifth Five-Year Plan and to prepare for developing the Sixth. Both the training and analytical phases of the program should be initiated and carried forward simultaneously, utilizing foreign specialists for the first three or four years.

A minimum of nine permanent professional analysts would be required to carry forward the program suggested on a continuing basis. Considerable formal training will be required for all staff members. Six should eventually have graduate training in agricultural economics, two in the general field of sociology, and one in statistics. Past experience in Syria and other countries indicates a high turnover in people trained for specialized positions of this type. Therefore, in order to assure a permanent staff of at least nine trained professionals on the job at the end of five years, it is suggested that twenty persons be recruited as soon as possible to initiate the program and to begin formal training. An additional two or three recruits will be required each year to maintain the minimum staff.

Recruits should include as many people with graduate training in one of the specialized fields as possible. At least six of the first recruits should initiate the analytical program with the assistance of foreign consultants. The remaining recruits should be enrolled in formal graduate programs as rapidly as possible. Institutions in Syria or other Middle East countries might be utilized for training a portion of the staff. However, U.S. Land Grant Institutions are more likely to provide the type of specialized training needed in agricultural economics, rural sociology and statistics and should be utilized in training most if not all of the staff.

In addition to formal academic training, it would be desirable to initiate a continuing on-the-job training program for the staff. Such a program would provide a means of equipping early recruits with knowledge of basic analytical tools that they would need in initiating the program. It would also provide a means of continuously updating the training of the staff and keeping them abreast of new analytical techniques as they are developed. The program would be made up of a series of specialized short courses which could be developed and conducted by specialists from Syrian or nearby institutions, from international organizations or from U.S. or other foreign institutions.

There will undoubtedly be some delay in recruiting and some recruits will require additional foreign language training before starting their graduate program. As a result, some of the recruits might start their graduate training the first year but some would not start until the second year. Some or all of the original six who initiated the analytical program might be sent for graduate training as those first sent complete their training and return.

All staff members should have at least a master's degree at the end of the five-year period. At least three of the most promising people receiving master's degrees should be selected to continue training to the doctoral level.

It is suggested that one of the professional analysts be designated as chairman or director of the staff with responsibility for coordinating the substantive activities of the group. If the staff is to function as professional analysts, it is essential that none become involved in administrative detail. The staff will require the assistance of at least two competent secretaries who can both speak and type Arabic and a foreign language. Other support required should be provided by the administrative unit of State Planning Commission. Each member of the staff (including foreign consultants) should be provided a small private office. The cost of providing such facilities will be considerably less than the losses incurred over a few years from lowered productivity resulting from two or more sharing the same office. The staff should have access to a small conference room where group discussion could be held as required.

Since it appears unlikely that the first recruits would have adequate experience and training to carry the proposed program forward effectively, it is recommended that the assistance of foreign specialists be obtained for at least the first three years. This would provide some overlap between the return of some of the recruits who will have completed their training and the departure of the foreign specialists. The foreign specialists should include at least two long-term resident specialists. One should have broad general training and experience in development economics and one should have extensive experience in the more specialized area of production economics. It would be desirable to have a third resident specialist who could provide assistance in the human resource area, particularly in population and manpower analyses. This area might be covered through the use of a specialist on a series of shorter-term assignments but this arrangement would not be as satisfactory as one providing for a resident specialist. Even with a team of three resident specialists, it would still be necessary to provide assistance of specialists on short-term assignment in a number of areas. This would certainly include assistance in the establishment of a scientifically designed area sample frame; in planning and carrying out any new surveys; and in developing linear programming and other models urgently needed for most effective planning. Other needs will undoubtedly surface as the program evolves.

Syria: Agricultural Sector Assessment

Volume 1: Summary Report

CHAPTER VII

PUBLIC POLICIES AND PROGRAMS

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CHAPTER VII

PUBLIC POLICIES AND PROGRAMS

The structure and performance of agriculture in Syria has been strongly influenced by the "package" of public policies chosen to develop the potentials of the nation's natural and human resources. They are also influenced by the extent to which these policies and their related programs and measures are implemented and coordinated. It is essential that this "package" provide all of the inputs and services required for effective agricultural development.

Agrarian reform has substantially improved equity in land tenure, and major land and water development programs have been undertaken so as to greatly expand the area of irrigated cropland. Policy emphasis has been given to comprehensive planning and licensing of agricultural production, as well as to major intervention by government in the pricing and marketing systems for agricultural commodities and inputs.

Nevertheless, despite the essential role seen for agriculture in national development, public investment in agriculture has not kept pace with other sectors, and performance in achieving goals on growth in agricultural output and self-sufficiency in major food commodities has lagged. Only since the mid-1970s has total agricultural production been at levels above those achieved in the early 1960s, and, reflecting the nation's extremely high population growth rate, per capita production levels have been lower in recent years than during the 1961-65 period. Food imports and foreign exchange requirements have continued to grow.

Although performance in agriculture is inherently subject to fluctuations in annual rainfall, there is continuing need to reappraise policy options and their priorities as to their contributions in achieving the production and other national goals set for the agricultural sector. The following sections thus examine a number of policy issues in the light of current government policies, and with regard to possible modifications or changes in priorities that would appear to be especially important to continued and accelerated development of the agricultural sector. Published statements of current policies and measures on agriculture are primarily found in annexes of the Fourth Five-Year Plan and in recommendations and guidelines adopted at the Sixth Regional Conference of the Ba'ath Party, see Table VII-1. The report on recommendations adopted at the 1977 Agricultural Seminar also includes policy guidelines relating to the various sub-sectors, as do the various Decrees issued to establish and implement programs and measures related to agriculture. Observed operations and practices of various agricultural organizations and institutions, as reported in other chapters and in the annexes, also are indicators of policy directions.

Table VII-1. Agricultural Sector Development Strategies and Policy Guidelines for the Fourth Five-Year Plan, 1976-1980, Syrian Arab Republic.

Development Strategies 1/

1. Extension of irrigated areas by maximum use of available water resources, in order to increase the volume and stability of production.
2. Intensification of land use to the greatest extent possible, in a ratio of 160 percent on irrigated land and 100 percent in the First Stabilization Zone.
3. Balance and complementarity between crop and livestock production.
4. Emphasis on investments in directly productive projects.
5. Selection of production units with the largest size.

Guidelines to Ensure Implementation of the Main Goals 2/

1. Plant irrigated areas intensively, and apply agricultural rotations with different agricultural crops at the rate of 200 percent.
2. Plant non-irrigated areas in the First Stabilization Zone in accordance with agricultural rotations with different agricultural crops at the rate of 100 percent.
3. In achieving the agricultural revolution, take into consideration the expansion and improved use of agricultural mechanization, and the provision of inputs (machinery, equipment, fertilizer, improved seed, pesticides and bags). The staff can use all modern supplies in the field of agriculture.
4. Provide livestock inputs and requirements (feed, water, medicine, barns, veterinary care.)
5. Provide the technical staff needed for the agricultural development plan.
6. Provide incentives for encouraging agricultural production and stability in rural areas.
7. Use obligatory planning of irrigated areas and the First Stabilization Zone, and license cultivation in these areas.

Continued

Table VII-1. (Continued)

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8. Continue (within the available resources) to control the areas which have flexible plans, and seek to increase its productivity.
 9. Be committed to buy all planned crops, regardless of the amount produced, at reasonable prices that are to be announced beforehand.
 10. Complete contracting for reclaiming all areas to be irrigated by the Euphrates Dam.
 11. Erect the North Big River Dam and reclaim the area to be irrigated by it.
 12. Implement projects for reclaiming saline lands, and take necessary measures for limiting the expansion of salinity in irrigated areas (especially the Euphrates area).
 13. Complete the Ghab and Rouge projects and improve the irrigation capacity of existing irrigation networks to provide water to all lands under these networks; also construct drainage networks needed for these projects.
 14. Expand the construction of surface dams (as far as possible) with the aim of collecting the largest amount of stream and rain water.
 15. Complete the survey of the First Stabilization Zone, the irrigated areas, and the optimal area for planting fruit trees.

As based on the goals for the agricultural sector, the following areas are planned to be available in 1980: 800,000 ha. of irrigated land (including the new reclaimed areas in the Euphrates Basin and other areas); 1,300,000 ha. of non-irrigated land (average rainfall more than 350 mm.) The livestock goals for the same year (1980) will be as follows: Dairy and by-products - 1 million tons, Meat (sheep, cattle, goat, poultry, fish) - 160,000 tons, and Eggs - 1.5 billion.

Supplementary Recommendations 2/

1. Develop a time schedule for the future Plan.
 2. Conduct an annual analysis of what has been implemented and circulate this to all of the Party staff.
 3. Stress the urgency to implement the principle of making wages contingent on production in the agricultural sector, which principle has been previously emphasized in other Conference resolutions.
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Continued

Table VII-1. (Continued)

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4. Stress the urgency for rapid implementation of the projects for constructing the Mid and Higher Khabur Dams, as well as for erecting a dam on the Jughjugh River.
 5. In carrying out party resolutions recommending that all forms of joint ventures be approved, the conference calls for applying these resolutions on all the lands that are included in the Euphrates Project. This, the Conference maintains, will be done by opening State farms.
 6. Direct the agricultural cooperatives toward conversion from cooperatives for agricultural services to socialist production associations. This involves providing the necessary resources for this conversion.
 7. Readjust the law for agricultural relations so that it will ensure an end to peasant migrations, contribute to an increase in production and give priorities among purchasers of land that an owner wishes to sell.
 8. Make the State the only party responsible for trading with cereals (the State being represented by the Cereals Bureau) and forbidding tradesmen and middlemen to take part in the process.
 9. Provide the Agricultural Bank with the necessary technicians to expand the Bank's services and regional coverage. Also, increase the amount of agricultural funds for financing all kinds of crop and tree production.
 10. Transfer the Agricultural Bank back to the Ministry of Agriculture and Agrarian Reform.
 11. Stress the urgency of developing construction plans for the villages, determine the priorities for these plans, and prevent all construction not included within the plan so as to preserve agricultural lands and facilitate the provision of necessary services.
 12. Make the public sector solely responsible for the marketing of the public sector's agricultural production, do not allow middlemen to be involved in the process, and take implementation measures within one year.
 13. Encourage the joint ownership of land, noting that this is one of our main objectives; and issue the necessary laws and provide the resources for achieving this objective.
 14. Establish a definite policy to (a) export agricultural products, and (b) find local markets for agricultural products.
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Continued

Table VII-1. (Continued)

Policies and Measures in Agriculture 3/

1. To achieve coordination and cooperation between authorities working in the field of irrigation and land reclamation in order to unite all technical efforts available.
2. To accelerate opening of a special section for irrigation in one of the colleges of engineering at one of the country's universities in order to make available the technicians needed by irrigation projects.
3. To provide support for the public sector companies operating in the field of water construction projects so as to enable them to fulfill the duties expected of them in the Fourth Five-Year Plan.
4. Obligate the government, through its establishments and companies, to buy all crops planned, whatever their production, in accordance with prices to be determined before the beginning of the agricultural season.
5. To adopt prices for agricultural products by taking into consideration the giving of a profit margin that is an incentive to increase production and to encourage the culture of new crops; to take into view price levels in neighbouring countries; and to increase the income of peasants in a way that will raise their standard of living and reduce the differences between their income and those of producers in other sectors of the economy.
6. To create a public marketing establishment that will take charge of the marketing of agricultural products, both crop and animal, and that will own the necessary means to carry out its duties, such as refrigerators, warehouses, transport fleet, etc.
7. To direct agricultural research toward solving problems impeding the development of agricultural production and services' operations, and to make available specialized technical cadres, incentives and conditions encouraging scientific research.
8. To develop methods of collecting and recording agricultural statistical data starting from the village level, and to extend the application of the random sampling method to a number of important crops.
9. To erect stations for servicing and operating agricultural machinery, in addition to mobile and stationary workshops for servicing agricultural machinery in production areas, and to instruct and train the necessary technical staff.

Continued

Table VII-1. (Continued)

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10. To accelerate securing protection to fish installations belonging to the General Fish Establishment.
 11. To extend the constitution of co-operative societies for raising and fattening sheep, to make available incentives, such as loans for the purchase of sheep livestock, and to erect the necessary warehouses and purchase the necessary forage.
 12. To provide the necessary services to local cattle breeders in order to train them and to improve breeds and productivity.
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Note: To designate specific paragraphs in this table, DS refers to Development Strategies, GL to Guidelines to Ensure Implementation of the Main Goals, SR to Supplementary Recommendations, and PM to Policies and Measures in Agriculture.

- 1/ Fourth Five-Year Economic and Social Development Plan of the Syrian Arab Republic, 1976-1980, Annex 2.
- 2/ Economic Recommendations Adopted by the Sixth Regional Conference of the Ba'ath Party, April 1975, Damascus, Syrian Arab Republic
- 3/ Fourth Five-Year Economic and Social Development Plan of the Syrian Arab Republic, 1976-1980, Annex 5.

A. Priority of Agriculture

The importance of agriculture to national development has been emphasized in the goal statements of the Five Year Plans, as well as in the resolutions adopted by the Ba'ath Party Regional Conferences, see Tables I-1, 2 and 3. As stated in the Fourth Plan and at the Sixth Conference, this sector forms an integral part of the developed agricultural-industrial economy that is to provide a solid basis for national self-development. And as noted earlier in Chapter I.B, achievement of goals established for the agricultural sector are to contribute in a fundamental way to achievement of the goals set for the general economic development of the nation. Not only is the agricultural sector expected to contribute through increased production of food supplies and employment of a major proportion of the nation's manpower, but it is also to contribute through foreign exchange earnings from agricultural exports, and through linkages with other sectors -- backward linkages involving purchases of production inputs, and forward linkages providing raw materials for further processing.

In seeking to implement these goals, major policy statements on agriculture, such as the Prime Minister's speech at the opening of the 1977 Agricultural Seminar, have recognized the essential role played by this sector in the national economy, and have highlighted the considerable potentials existing for agricultural development. However, it was further recognized in the Prime Minister's speech that "several political, economic, financial, and human factors" have hindered the development of these potentials and have slowed the pace in achieving stated growth goals. These included failure to establish appropriate production systems; limited financial resources of the State; need for basic infrastructure, as dams and agricultural machinery and fertilizer factories; and limited traditions of collective efforts among farmers.

In recognition of the difficulties encountered, the government directed in its Cabinet Policy Statement that measures be taken to overcome the problems affecting agricultural sector development, and that these measures be given top priority. The Agricultural Seminar, with participants including political leaders as well as technicians, was accordingly convened to develop policy recommendations on the various aspects involved in agricultural development. The nature and scope of these recommendations, along with other policy statements on the sector's development, are reviewed in the sections which follow below.

However, in addition to noting the government's policy positions as to the important contributions required of the agricultural sector, as well as the high priority to be attached to this sector's development, it is also necessary to consider the investment policy pursued by the government with respect to the allocation of public resources to agriculture. As shown in Chapter I.C and

Table I-5, the funds to be invested in the agricultural sector during the five-year period of the Fourth Plan accounted for about 21 percent of the Plan's total. However, about 14 percent of the Plan's total funds were allocated for the completion of the Euphrates Dam and the irrigation of the Euphrates Basin, with about 7 percent of the total to be invested in all the other agricultural sub-sectors. By way of comparison, five year allocations of 23, 17, 13 and 14 percents were planned, respectively, for the Industry and Mining, Energy and Fuels, Transport and Communications, and Services Sectors.

Contrasting with the planned investments for the five-year period, are the development budget allocations made to agriculture vis-a-vis the other sectors on an annual basis from 1976 through 1979. As shown in Table I-5, the agricultural sector received 57 percent of the average annual allocation required to meet the planned five-year investment, while other sectors received 94 percent as a group, with certain individual sectors receiving substantially higher percentages. It can only be concluded that investment policy with regard to the agricultural sector has not provided public resources to the degree required by an agricultural policy calling for priority development of this sector. Considering also that domestic demand for food, based on population growth alone, is projected to double over the next two decades, relative priorities in investment policy will need to be substantially raised with regard to allocation of funds for increasing agricultural production and productivity.

In addition, the allocation of public investments within the agricultural sector has been heavily weighted towards irrigation development and accounted for some 83 percent of the sector's total allocations during the Fourth Plan; see Table I-6. As noted further in following sections, increased attention will need to be given to the development of policies and the strengthening of institutions that must provide the supporting services which are required to obtain adequate returns from the major public investments in large-scale irrigation infrastructure.

B. Structure of Agriculture

In seeking to achieve growth, equity and other goals set for the agricultural sector, the government implements certain basic public policies and programs that have important influences on the structure, or economic organization, of agriculture. The effects of the policies are seen in relation to both the pattern and scale of agricultural resource ownership, and the decision-making process which controls the utilization of these resources. In general, these policies come within the scope of the economic principles set forth in the Constitution of 1973 which state that property, such as land and other resources used in agricultural production, may be owned by private individuals; by co-operative, professional and other social organizations; and by the State. In addition, such property is to be utilized in the service of the nation and in accordance with national development plans.

Through the Agrarian Reform program, which was largely carried out during the 1960s, the expropriation and redistribution of land significantly changed the land tenure pattern to one now characterized by a large number of land holders each having relatively small sized farms. (In 1970, about 94 percent of all land holdings were 30 ha. or less, and 50 percent were 5 ha. or less.) Implementation of this major program has thus contributed substantially toward achievement of the nation's equity goals.

However, the relatively small size of the holdings, and especially the fragmentation of the holdings due to inheritance laws, can be seen as raising difficulties in achieving goals of expanded agricultural production. With holding averaging 3 ha. and composed of 4, and up to 10, non-contiguous plots of land, the use of mechanization as well as certain other productivity increasing technologies is not possible. In addition, use of mechanization as a means for meeting labor shortages is also precluded. Thus attention is needed to devise alternative land tenure policies that can effectively deal with the problems arising from fragmentation.

Tenure patterns are also characterized by a high proportion of agricultural land under private ownership. In 1977, about 76 percent of the cultivated area was privately held, but in addition, production units also included state farms and cooperatives.

In line with policy statements calling for public sector participation in agricultural production, as well as for joint ownership of land, a number of state farms and production cooperatives have been established in various agricultural areas of the country, see Table VII-1, SR 5, 6 and 13. Under the general jurisdiction of the Minister of Agriculture, the MAAR operates six state owned farms engaged in crop production, and three of the General Organizations operate farms producing poultry, dairy and fish products. Also, following completion of the Euphrates Dam, six former state farms for crops in Hasakeh were converted into production cooperatives for farmers whose land were inundated by the reservoir's waters. In these cooperatives the land is owned and farmed jointly.

The role of these state and cooperative production units, however, has generally continued to be relatively small, accounting for only about one percent of the country's cultivated land areas as well as of the total output of the commodities they produce. Also, various inefficiencies and difficulties in the operations of state farms, as discussed at the 1977 Agricultural Seminar, led to recommendations, now being implemented, that especially the farms of the cattle and poultry organizations be converted from direct production operations into research and extension activities only. In addition, interest among farmers in the formation of more production cooperatives does not appear to be generally forthcoming.

On the other hand, programs to develop service-type cooperatives, have resulted in more than half of all land holders being members of cooperative associations. In 1977, about 23 percent of the cultivated land was farmed by these cooperative members. While there are specialized cooperatives, especially for sheep breeding and fattening, the majority of these cooperatives (3,107 out of 3,345 in 1977) are of the multipurpose type. They act as intermediaries for farmers in dealing with various government organizations engaged in the supplying credit and production inputs, as well as the purchasing and marketing agricultural commodities. In the case of this type of cooperative activity among farmers, however, the participating cooperative members retain ownership and manage the use of their own land.

Noting that most agricultural land in Syria is privately owned, the 1977 Agricultural Seminar adopted a policy designed to reactivate this private sector through the use of various incentives. In particular, the incentives are to encourage investment of the agricultural sector's savings within the sector itself, rather than to have them transferred to other sectors. Measures to implement this policy are to include pricing, taxation and technical incentives, especially to encourage investment in the production of poultry, dairy, fish, greenhouse and forestry products. Other recommended incentives would be to allow establishment of private companies with the right to import directly and to deal with various agricultural equipment and commodities, to permit contracting to obtain needed foreign expertise, and to facilitate investment in agricultural development by Arab and other friendly foreign countries. It appears that the clear cut and active implementation of policy measures such as these relating to privately held land would strengthen the overall economic structure of the agricultural sector and thus would lead to expanded and intensified development of the sector's physical and human resources.

In addition to the policies and programs influencing land tenure, the economic structure of the agricultural sector is also profoundly affected by the basic policy which requires the planning of essentially all agricultural production within the context of the current Five-Year Plans. Agricultural production is to be rationalized by specifying and enforcing land use, cropping schemes and cultivation practices consistent with the best agricultural practices so that the specified annual production targets are met. This policy, along with related policies and implementing programs, thus provide the institutional framework within which decisions are made on private, cooperative and state farms as to the utilization of agricultural resources for the production of agricultural commodities.

The implementation of this policy is based on the detailed Annual Agricultural Production Plan prepared by the Ministry of Agriculture, and rests on the Ministry's responsibility for licensing each farmer and certifying his proposed land use as consistent with the Annual Plan. (Licensing is not required for

farmers having less than 2 ha, or those on rainfed land with mean annual rainfall of less than 250 mm). The other main instruments for ensuring implementation of this production planning policy are the provision of farm inputs to licensed farmers on credit through the Agricultural Co-operative Bank, obligatory purchasing of specified crops by government marketing organizations, and policies on the pricing structure for inputs and commodities.

In general, the programs that have been established to implement the policy of production planning having provided a comprehensive and relatively rigid system for directing the use of agricultural resources toward specified output targets. Nevertheless, it appears that in recent years there has been considerable variation between planned and achieved production of various commodities, both at national and Mohafazat levels, and for both irrigated and non-irrigated crops. (See Chapter I.C.)

In addition to the major influence of annual weather fluctuations, the deviations between planned and actual output may also reflect targets projected on the basis of insufficient data as to yield responses to inputs, market demand conditions, and on availability of land, water, labor and other required production resources. Thus, implementation of the production planning policy could be strengthened through the development of expanded capabilities for carrying out analyses on the economics of agricultural production and marketing processes. (See Chapter VI.F.)

It also appears that the implementing programs have too little built-in flexibility to allow farmers to make decisions on adjustments to changing weather and economic conditions that could result in higher production levels. For example, crop allocations are usually made before weather conditions at planting time are known, although rainfall patterns in marginal regions strongly influence planting decisions. Specifications as to physical inputs to be used often apply to large land areas while local agronomic conditions may vary considerably. Also, the financing of inputs is generally set at levels for marginal producers, while additional inputs made available to better producers could substantially increase output. In addition, rigidly carrying out the mix of crops allocated at the Mantika level to individual farms can result in small parcels where a large number of unrelated crops are cultivated.

Thus, it appears that if additional flexibility were built into the production planning programs, farmers could adjust more readily to changing conditions and their increased participation in the decision making processes could substantially enhance the output of the agricultural sector.

C. Natural Resource Development

To direct efforts toward achievement of the dominant agricultural sector goal of increased production, major policies have been established that stress both extensive and intensive development of the nation's natural resource base. Extensive development primarily involves increasing the land area that is allocated to agriculture for the support of crop and livestock production. There are also corollary policies to guide water resource development in the various ecological zones, as well as policies designed to protect and conserve the existing natural resource base. Policies on intensive development of land and water resources seek to expand agricultural production through increased yields (increased output per unit of input), and these are examined further in the following section on production intensification.

Irrigated Agriculture

Policies aimed at expansion of the land area suitable for agricultural use have emphasized "extension of irrigated areas by maximum use of water resources, in order to increase the volume and stability of production", Table VII-1, DS 1 and GL 14. In addition, policies established to guide the development of irrigated agriculture have given primary emphasis to large-scale programs, most notably the Euphrates Dam and the Euphrates Basin, but also in the Ghab Region, Table VII-1, GL 10 and 13. Additional policy statements have stressed the urgency of constructing dams and irrigation networks in various other areas of the country, such as the Khabour, Jughjugh, Kabir and Rouge Rivers, Table VII-1, SR 4 and GL 11 and 13.

However, in 1977, at the conclusion of its review of problems encountered in the implementation of major irrigation schemes, the Agricultural Seminar proposed a number of modifications to policies on irrigation development that appear to be essential for improved sector performance. Noting the severe problems with gypsum and salinity, and considering the situation as to technical, financial and human resources, it recommended that land reclamation in the Euphrates Valley should be introduced gradually with the various schemes being developed in stages. This approach could avoid potential problems that might arise from proceeding too quickly when major technical problems were still unsolved, and, in addition, this gradual approach is to be based on a regional plan that covers technical, economic and social development in the Euphrates Basin, and that is integrated into national plans. This policy approach is also to be supported with programs and measures on management and use of reclaimed lands, reassessment of the economic feasibility of reclamation projects, guides to utilization of the Euphrates waters for agricultural, drinking and industrial purposes, and attention to environmental problems to avoid pollution as a result of implementing the development schemes.

The Agricultural Seminar also noted that in some areas, because of the complex conditions of the gypsum lands, very high development costs would be encountered, and thus the economic feasibility of schemes already planned for these areas would be adversely affected. Accordingly, the policy recommendation was to postpone or cancel development plans in such cases, while on the other hand, to increase priorities on identifying and developing irrigation potentials, where technically and economically feasible, in other areas of the country. More rapid implementation was thus urged for the surveys underway on the country's various water basins, and, in addition, higher priority is also to be given to construction of irrigation networks at dams that have already been completed.

In planning the rate and extent of irrigation development to meet national needs for increased agricultural output, it appears that, in the short run, increased attention will need to be given to improving the productivity of existing irrigation facilities and to development of smaller, high-potential irrigation schemes. At the same time emphasis will be needed on increased productivity of the rainfed areas. For the longer run, however, full development and utilization of all irrigation potentials will be essential. Detailed analyses of these irrigation/rainfed development options should be initiated to provide empirically based guidelines for policy decisions.

Development of groundwater resources for the purpose of expanding the irrigated area of the country received much less attention than surface water in the Fourth Plan and the Sixth Regional Conference. However, various policy recommendations on irrigation at the 1977 Agricultural Seminar did direct attention to the development of groundwater, and urged implementation of programs to use groundwater in the Tal al Ala, al Asharney and al Ghab projects, to study changes in ground and surface water balances, as well as to explore the Damascus, Orontes, Aleppo, Coastal, Yarmouk and Steppe hydrological basins. Use of sprinkler irrigation was also recommended by the Seminar as another means for extending the land area under irrigation, especially in those cases where topographic and other conditions make this method more advantageous.

At the Agricultural Seminar, the need to protect agricultural land from growing urban encroachment was noted. In referring specifically to irrigated lands such as the Damascus Ghouta, the Prime Minister called for measures to guide urban growth so as to protect and to permit further development of these productive irrigated lands.

Rainfed Cropland

As noted above, policy directives are clear cut in seeking to expand the area of cropland under irrigation. In the case of rainfed lands, however, major policies on natural resource development have been oriented instead toward increasing the output of such lands through improvements in yields, Table VII-1, DS 2 and GL 2.

This policy direction reflects the present pattern of land use in which essentially all of the rainfed lands that are cultivable are already being used for crop production. However, even though rainfed lands account for some 90 percent of the total cultivated area, their productivity and output varies considerably from the higher rainfall areas of the coastal region, for example, to the marginal areas bordering the steppe where rainfall is minimal and fallowing is widely practiced.

While policy measures on improvement of crop yields are examined in a later section, it can be noted here that the policy recommendations of the Agricultural Seminar which aim at exploitation and development of water resources in the various hydrological basins may result in opportunities for more intensive crop production practices in these rainfed lands. Even in the higher rainfall areas of the coastal region, the development of groundwater sources can be useful as supplementary irrigation in the summer. Rainfall ceases in May and this not only hinders the maturation of winter wheat, but also results in inadequate moisture for plantings of warm season vegetables.

Steppe Rangelands

As with the rainfed lands, development policies for the steppe are oriented toward measures that will increase the productivity of this extensive region. Since the steppe has a rainfall that is inadequate for crop production without irrigation, the major agricultural activities related to development of grazing land resources for increased production of livestock and livestock products. Protection and conservation are also seen as being major considerations in the development of these natural resources.

In follow up to the Prime Minister's call for higher priority on development of the steppe, policy recommendations were made at the 1977 Agricultural Seminar to improve grazing and livestock resources through assistance to cooperative associations formed for the production and marketing of sheep. At the same time, development of water resources in the steppe for use by livestock was urged through construction, improvement and control of dams and wells. Where available, additional water supplies would be used for irrigating crops, pasture and trees near the dams.

Measures were also recommended to protect the steppe's resources. These would include the mapping and inventorying of plants, animals and water resources, defining appropriate uses and carrying capacities of the resources, issuing a new law to control resource use, including prohibitions on crop cultivation, and forbidding the hunting of wild birds and animals to restore environmental balance.

Forestry

Policies on the development of the nation's forestry resources have been directed toward protecting and conserving existing forest lands, as well as toward expanding the area of land planted to forests. In addition, attention is to be given to increasing the productivity of these natural resources, both with regard to timber output and to use of these resources for tourism and recreation.

A major policy measure recommended by the 1977 Agricultural Seminar was the enactment of a new law on forestry resources that would provide for the protection and development of these resources in accord with present social and cultural conditions. Sections proposed for the law, as well as other Seminar recommendations, would protect the woodlands and other natural resources through control of animal grazing and construction of buildings in forested areas, as well as by establishing wildlife sanctuaries. Besides requiring various organizations to plant and maintain trees in cities and villages, along roadsides and in other areas, landowners would be given incentives to plant trees on their land. The role of forest lands would be given higher priority in tourism and environmental planning, forest resources would be surveyed and classified, and a General Organization for Forests would be established to better coordinate and manage these resources.

Fisheries

Policies on development of the nation's fishery resources have aimed at expanding the fish catch from both the marine resources of the Mediterranean Sea, and from inland waters, including both rivers and other natural pools, as well as in man-made lakes behind dams and on fish farms. The implementations of these policies is centered in the General Establishment for Fish, headquartered at Jableh.

The 1977 Agricultural Seminar recommended that more fish farms be established on lands not suitable for agricultural cultivation, and that steps be taken to increase the productivity of man-made lakes, chiefly Lake Assad but also others. Measures were also recommended to protect these types of facilities, including laws forbidding unauthorized fishing in them.

Improvement of sea fishing, both in territorial waters as well as on the high seas, is to be achieved through provision of modern fishing boats and training of personnel.

D. Production Intensification

Progress toward the dominant agricultural goal of increased production will be advanced through implementation of the policy, as noted above, that seeks to expand the area of cultivated land through extensive development of the natural resource base. But greatly intensified land use has also been selected as an essential parallel policy to achieve greater output of crops and livestock products, i.e., greater production through increased yields (or increased output per unit of input). Cropping indices ^{1/} of 160 percent on irrigated land, and 100 percent on non-irrigated land of the First Stabilization Zone, are targeted in the Fourth Plan (DS 2) and these indices are applied in the preparation of the Annual Agricultural Production Plans.

In addition, this policy of intensification of land use can also be expected to assume increasingly higher priority as it becomes the major means available for achieving the goal of expanded agricultural production. Nearly all of the suitable rainfed lands are already under cultivation, and so yield increases are the main route to greater output. In the case of irrigated land, the completion of schemes already planned are expected to utilize the available water resources, and so more intensive utilization of irrigated areas will also become increasingly essential. Thus development planning and agricultural investment, which have been stressing major schemes for expanding irrigated areas, will need to be oriented more and more toward the complex of measures and programs required for land use intensification.

To implement this policy of greater production via increased yields, emphasis is directed toward measures and programs that introduce, or expand the use of, modern agricultural technologies and improved farm inputs, Table VII-1, GL 3, and Agricultural Seminar recommendations. These include, for example, improved cultural practices, improved seeds, crop protection, fertilizer use, water management, and mechanization.

In many cases, these technologies and inputs are complementary and must be introduced as a "package" if they are to have value in increasing yields beyond those attainable when one or more of the components is missing. In like manner, the introduction of yield-increasing technologies also requires the coordinated participation by numerous institutions so as to provide the environment and to deliver the "package" of services which are essential for an efficient and expanding agricultural production process. Policies guiding development in many areas of the agricultural sector thus have direct or indirect impact on implementation of land intensification policy.

^{1/} Cropping indices refer to land actually planted as a percentage of land under cultivation, including fallow.

For example, achievement of higher yields requires use of various farm inputs, such as fertilizer, improved seeds and machinery. Of course, the actual availability of such inputs in the hands of the farmer, as well as the inputs' suitability, timeliness and cost, depends directly on the implementation of marketing policies by various marketing organizations. But in addition, information must be provided to farmers on proper use of inputs so that they actually achieve higher yields. The dissemination of this and related information on management practices relies on policies and programs relating to the organization and methods of agricultural extension which, in turn, depends on the technical recommendations resulting from policies on the role of agricultural research. As to mechanization programs to increase yields, credit policies on machinery loans as well as policies on cooperative use of machinery, affect the extent to which these mechanical services are available to farmers. And, equally or more important, policies on land tenure and fragmentation of holdings establish the overall environment within which the use of mechanization advances or not. In addition, the continuing and expanding use of yield-increasing inputs requires incentives and these are directly affected by pricing policies, both as to the cost paid by the farmer for the inputs and the prices received by the farmer for the increased output of crops produced with the new technology. Policies on the economic structure of agriculture and the planning of production also affect farmers' incentives, and incentive policies with regard to personnel of marketing, extension and other organization influence the extent and efficiency by which yield-increasing inputs actually do contribute to achievement of higher yields and expanded agricultural output.

In addition to coordination of activities by the various institutions affecting the agricultural production process, availability of basic data on the scope and potentials of the nation's natural resources is essential in order to develop and refine the policies and programs that guide the land use patterns and farming systems of the agricultural sector.

In general, agricultural planning in Syria, including the preparation of the annual agricultural production plans, is keyed to the five stabilization zones or agricultural areas that have been identified primarily with reference to rainfall patterns. However, because of the variability in soil types and climatic condition in Syria, as well as the need to conserve resources and maintain ecological balances, the natural resource data should be as detailed as possible, and should preferably cover relatively small and homogeneous areas. Thus the detailed delineation of the nation's natural resources into Resource Planning Units (RPU) and Production Potential Areas (PPAs) and the development of land use information through the use of satellite imagery provides an expanded and improved data bank that can be utilized in developing policies and programs on land use intensification. (See Chapter II, and Volume 2.) Additions to, and refining of, the computerized data in the future will also increase the usefulness of the natural resource technical information base.

Detailed and continuing economic analyses of farm enterprises in the various agroclimatic regions of the country are also essential if policies and programs on yield-increasing technologies and inputs are to be based on full consideration of the costs and benefits involved, both from the standpoint of individual farmer returns and incentives, and as to their impact on agricultural sector goals. The carrying out of such economic studies on farm production costs and returns, as well as studies on costs and returns in the marketing of inputs and commodities, has been extremely limited. Thus the detailed economic data obtained from the 1,500 farmers surveyed as a part of the agricultural sector assessment, provide a valuable current source of such information. While considerable economic data by crops, farm size and RPU for eight agricultural regions of the country have been presented in Chapter III, and in Annex 3, further in-depth analysis of these farm survey data should have high priority so as to provide an expanded and improved analytical basis for developing and refining policies and programs aimed at agricultural production intensification.

E. Pricing and Marketing

Along with the policies requiring the planning and licensing of most agricultural production, a comprehensive pricing policy is also being pursued through which many prices are administratively fixed at the farm level for inputs and commodities, as well as at wholesale and retail levels of the marketing system. Related policies require substantial public sector involvement in the operations of the marketing system at all levels by various ministries and state marketing organizations, and the use of subsidy programs in order to raise the level of certain farm commodity prices as well as to hold down farm input and consumer prices.

Through the implementation of these comprehensive policies so as to achieve stated national goals, government has taken on widespread responsibility for the economic performance of the agricultural sector, as well as of other sectors with linkages to agriculture such as industry and trade. Nevertheless, as noted previously, performance and investment has lagged in the agricultural sector. In view of the complex nature of agricultural production processes and of agricultural marketing systems, it may be that the public sector has become too involved in these activities with resulting counter-productive effects on efficiency and investment in agriculture. While seeking to achieve the same stated national goals, the following modifications in policy direction may be considered.

The difficulties in effectively administering the production, pricing and marketing of several crops and/or livestock products are great because of the substitutibility among crops by producers and among end-products by consumers. Slight misjudgements in terms of price setting and production planning can result in surpluses or shortages of specific items, not to mention the implied misallocation of resources. In contrast, concentration on the control of a few major crops, with some selective marketing activities to limit the excesses of the sector, would seem to be the more fruitful policy direction.

In view of the complexity of the marketing process, as noted above, and the frequency and multiplicity of pricing decisions that need to be made for efficient operations, it would appear that a policy of selective controls and limited direct participation by the government would be more effective and less costly than seeking to dominate the agricultural marketing system. Better ways of controlling exploitation, while at the same time promoting marketing efficiency, could include modest government purchase and storage activities to keep prices reasonable, along with government provision of adequate market information on prices and supplies for both producers and consumers.

The use of a fixed pricing policy limits both operational flexibility in marketing operations as well as incentives to expanded output and operating efficiency. Instead of fixed prices, the utilization of price supports for selected commodities should be considered. While price supports will provide protection to producers against uneconomically low prices, at the same time this policy would allow prices to rise more for those products in greatest demand and/or shortest supply. Price floors should not be set so high that surpluses occur frequently, but this flexibility above the price support level approach will aid in rational allocation of both production and consumption, and can increase total agricultural output. Price supports can also provide a floor under farmers' incomes, although the benefits are proportional to farm size. Since many farmers have relatively little to sell, other methods of income support, such as direct payments, can be utilized.

In administratively setting farm and retail prices, the prices of certain commodities are subsidized for purposes growth, equity or other goals. While such subsidies can provide incentives for increasing and reallocating production, as well as support farmers and consumers' incomes, their costs, as well as their impacts on economic efficiency, can be very substantial. Although data are not readily available, it appears that the cost of direct and operating subsidies in Syria is relatively large, at least for certain commodities. These costs can be expected to continue growing as farm prices are set at higher levels, unless consumer prices are increased accordingly. Also, the more reliant the Syrian agricultural economy becomes on subsidies, the more maladjusted it becomes relative to both domestic and international supply and demand conditions. Careful analysis is needed of subsidy dependence on a crop by crop basis, as well as of subsidy costs and their burden on various segments of the population.

The implementation of the various programs used to carry out pricing and marketing policies, 1/ as well as evaluation of the policies and programs themselves, requires the careful analysis of large volumes of data. It appears that considerable data may be available among the various ministries and general organizations, but no central analytical staff to evaluate the data was apparent. The establishment of such a staff for agricultural economic analysis, as recommended in Chapter VI.F, could be especially useful to decision makers responsible for policies on pricing and marketing which have substantial impacts on the agricultural sector and the national economy.

In considering policy modifications that can lead to improved performance of the total marketing system, re-evaluation of the market structure as it now is constituted could lead to a clearer delineation of those marketing activities where government participation is required to achieve efficiency, and those where private control is more efficient. In areas where only one or a very few firms can operate efficiently, higher performance toward achieving society's goals may be achieved by government operation, by government being a competitor, by private operation under government controls, or by producer or consumer cooperatives. On the other hand, where a fairly large number of firms can compete in the business, the industry is likely to perform better in the private sector with government providing and enforcing the rules of competition and allowing the market to set prices.

For public sector organizations engaged in commodity marketing, it appears that policy measures and programs need to more strongly stress efficiency in marketing management and operations. Because of their dominant, or monopoly, role in many marketing functions, increased operational efficiencies can return substantial benefits to the agricultural sector and national economy.

With regard to improvements in private sector marketing, it appears that uncertainty and the policy of increased public control have stagnated the mostly private wholesaling and retailing functions. Thus, improved performance in this area could be forthcoming from the publication of a clear policy indicating that food retailing is to remain primarily in the private sector, and from encouragement of investment with government loans and assistance for building new facilities.

1/ For example, a recommendation adopted at the 1977 Agricultural Seminar requires that numerous factors be considered as a basis for fixing prices of agricultural products at the farm level, including cost of production, seasonality, quality and quantity of product sold, supply of competitive products, prices in foreign markets, agricultural prices in relation to the general price level, climatic conditions, subsidies granted by the government, and a profit margin of 20 percent.

The role of agricultural credit is recognized as an input of major importance to the development of the agricultural sector, and the policy of the government emphasizes the use of a specialized institution, the Agricultural Cooperative Bank (ACB), as a primary means for making short, medium and long term credit available to farmers. Interest rates are highly subsidized, and nearly half of the loans are channeled to individual farmers through cooperative associations.

While the Bank's loaning policies in recent years have resulted in a commendable increase in medium and long term loans, the inadequacy of funds available to the ACB for these types of loans has also lead to a relative decline in short term loans. To avoid a reduction of short term loans, which usually have a high payoff for producers, as well as to support medium and long term loans for investments in mechanization and other production expanding technologies, the ACB should be permitted to discount its medium and long term loans to private as well as cooperative sector borrowers with the Central Bank as an additional source of funds. Additional funds should also be sought from Arab and international financing organizations, as well as through encouragement of increased deposits in the Bank by the private sector. In addition, government policy with regard to limits on size of loans appears also to need re-evaluation. Restrictions in terms of maximum loans that can be made for individual crops to a single grower can seriously constrain farmers in their efforts to mechanize and achieve operating efficiencies and should be eliminated.

The role of physical inputs required for agricultural production is also recognized as essential for improved productivity in the agricultural sector, and the general direction of policy has been to expand flow of these inputs chiefly through public sector involvement in this aspect of marketing. Various general organizations and ministries are major participants in the production, import and/or distribution of feed, fertilizer, fuel, insecticides, agricultural machinery, seeds, and breeding stock.

The efficient implementation of the input policy, however, has been handicapped by certain bottlenecks relating to storage facilities and delivery of inputs. While permanent storage capacity has been increasing, it has not nearly kept pace with the increase in demand for feed, fertilizer and seed storage facilities. In the case of feed, storage capacity is inadequate to handle the proposed feed reserve, and without additional storage there exists the possibility of mis-allocation of feed to various regions of the country. Also, delays in the delivery of inputs can cause delays to the farmer in planting his crop, thus reducing production. Attention is needed on delays in the delivery of inputs from the ports to the local distribution warehouses, and in addition, the location of distribution stores often requires farmers to travel considerable distances to take delivery of his inputs.

Another bottleneck appears to be the lack of qualified field extension personnel to assist farm operators in the proper use of improved farm production inputs so that they can actually obtain the increased benefits of these inputs. For example, farmers who purchase dairy cows must understand their need for proper nutrition in order to achieve the potentially high milk production levels.

F. Rural Development

Growth in production is the overriding goal set for the agricultural sector, and most agricultural policies and programs are oriented in this direction. However, policies and programs directed toward achieving national goals of equity for all citizens also strongly influence the development of the agricultural sector and the quality of rural life. In seeking to reduce differences between urban and rural areas as to the economic and social condition of citizens, policies and programs have been formulated to improve incomes of farmers, expand rural employment opportunities, and provide education, health, housing, utilities and other social services to all rural residents.

It can be noted that the implementation of such policies and programs for rural development also contribute to achieving other social and economic goals as well. Improved rural life can avoid a polarized type of development where industry and services are concentrated in one or two urban centers while stagnation and out-migration come to characterize the rest of the country. In addition, rural development policies, by slowing rural-urban migration, can both reduce burdens on the cities, and avoid the loss of the most productive members of the agricultural labor force. Productivity goals are also likely to benefit as a result of programs that raise the skill, literacy, health and nutrition levels of the rural population.

Income and Employment

Since agriculture represents a major portion of the population and activity of the rural sector, increasing per capita agricultural incomes is a direct means of upgrading the quality of rural life. Per capita incomes can be increased through higher prices for the commodities produced, through lower prices for farm inputs used, and through greater productivity and increased volume of production. Policies and programs relating to each of these means for increasing farmers' income have been integral parts of the Five-Year Plans, and major aspects of these policies were reviewed previously in sections dealing with Pricing and Marketing, and Production Intensification.

In addition to enhancing farm incomes, increased non-farm rural incomes also contribute directly to the improvement of rural levels of living. Improved and expanded non-farm employment opportunities provide the primary means for this, and policies have been formulated to encourage development in this direction. In addition to programs for developing rural handicraft industries, such as rug and carpet weaving, the location of industrial projects is to be geographically distributed in the country so as to provide employment opportunities for rural manpower. Rural employment also benefits from construction of rural infrastructure, such as roads and water systems, and from agriculturally-related marketing activities, such as processing and distribution of farm commodities and production inputs. The continuation and strengthening of these policies and programs will become increasingly important as mechanization of agricultural production advances, and as higher cash incomes are sought in urban and foreign areas.

Infrastructure and Social Services

In pursuing national equity goals, numerous ministries and other agencies are implementing policies and programs designed to provide education, health, housing, utilities and other social services to all citizens, including those living in the rural areas of the country. These policies are directed toward not only reducing regional differences within the country, but also between rural and urban areas within the regions and Mohafazats.

Implementation of these policies and programs over the past decade and a half has brought about substantial improvements in the availability of social services in both urban and rural areas of the country. Nevertheless, this growth in services has favored the urban areas, especially the largest ones, Damascus and Aleppo, and thus the levels of education, health and other services continue to be maldistributed as between the urban and the rural areas. In general, from 1976-78 under the current Five-Year Plan, annual per capita expenditures at the local level for these services have been slightly higher in rural Mohafazats as compared with the more urban Mohafazats, see Table I-9. Per capita expenditures were considerably higher in rural areas for water supply and road projects, and also for health projects, although the total expenditures for health were much below planned levels. This pattern was clearly reversed, however, in the case of education, which accounted for nearly half of the planned expenditures, as well as for municipality structures and utilities. Thus, while implementation of the policies on rural services is reducing some of the rural/urban disparities, higher priorities will continue to be required to further reduce the gaps, especially for education and health.

Responsibility for implementing the programs that provide education, health and other services to rural areas is vested in a large number of ministries and in various other agencies, such as the Peasant's Union, while in some cases, certain international organizations are also involved. In the case of formal education, for example, the Ministries of Education, Higher Education, Industry, Agriculture, and Commerce each have responsibilities, while responsibilities for adult education, training and literacy are dispersed to an even greater extent. To deal with the complexity and duplication resulting from the large number of authorities involved, a series of inter-ministerial coordinating committees has been established. Nevertheless, the problems of coordination and duplication, while inherently difficult with large numbers of disparate programs, will need continuing attention if improved rural levels of living are to be achieved. It appears that the Rural Development Centers, of which seven have already been established, provide a potentially useful structure for both physically and administratively bringing together the mix of programs and services which are essential to rural development. Thus, expanded efforts with the Rural Development Center idea seem warranted, including modifications which would assist in tailoring programs and services more closely in accordance with local conditions. Also, in view of the diversity among regions of the country, the use of relatively homogeneous agro-ecological zones (RPU's) should be explored as to their potential for the planning and implementation of social service programs.

Population

Population growth in Syria is at very high levels, and there is little evidence for an impending decline. Thus the impact of this growth on the agricultural sector will be one of continuing pressure to expand food production so as to maintain per capita consumption levels while avoiding undue increases on food import and foreign exchange requirements. In addition, with fertility rates especially high in the rural sector and with farm employment opportunities declining due to greater use of modern technologies, problems of rural-urban migration and of non-farm employment will be intensified. To minimize these impacts, policy options need to be again reviewed on developing an active program that will make family planning available to all, to be used on a strictly voluntary basis by those desiring smaller families.

Bedouins

Although Bedouins account for only about 7 percent of the total population, they are an important element in Syrian economic and agricultural development. For example, they account for much of the sheep production and, with sedentarization, increasing numbers of tribesmen are becoming involved in crop production.

Policy toward the legal and social position of nomadic and semi-nomadic people has changed in recent years from one of ambiguity and separatism to one where they are now looked upon as full citizens entitled to all the services due any other citizen of the country, including health and education. These services are to be provided by the regular ministries, but it is also recognized that they have special problems requiring special services. Thus the Directorate of the Badia, in the MAAR, deals specifically with the problems of the Steppe.

This policy of bringing the Bedouin into the mainstream of Syrian life offers more options to these mobile people, and the government is taking responsibility for improving the quality of life on the Steppe. Although no comprehensive plan yet exists, innovative efforts are underway, most importantly the Range and Sheep Improvement Cooperative Program, along with the supplementary feed program. Besides seeking to improve range productivity, the cooperatives at the same time can provide a means for delivery of social and marketing services to semi-nomadic peoples. Continued development of these policies and programs will need attention, and research, to find answers to major problems still unanswered, including how to control flock size, and how to allocate and regulate the grazing of sheep by individuals and by groups.

G. Institutional Support

The constitutional framework and governmental structure provide the over-all environment within which agricultural development takes place, while various public institutions, ranging from central government agencies through to village level units, are engaged both in productive activities as well as in programs to support and promote agricultural and rural development throughout the country. Thus the structure, operating policies and administration of these public institutions bear directly on the efficiency and effectiveness with which the complex of agricultural development policies and programs are coordinated and implemented.

Development Administration

Reflecting the major role assigned to the public sector in the achievement of economic and social development goals, numerous policy guidelines have been adopted at the Regional Conferences, and set forth in the Five-Year Development Plans, with regard to the operating policies and performance of public institutions. They direct that attention be given to improving a wide variety of administrative areas, such as greater coordination and cooperation among agencies, avoiding duplication of activities, following up and reporting on implementation of programs, setting standards of performance in public sector organizations, improved organizational structure of administrative staff, and incentives for, and training of personnel. Also, at the 1977 Agricultural Seminar, policy statements were adopted on the need to study the administrative system of the agricultural sector at all levels, including a reorganization of the MAAR's organizational structure, as well as on financial incentives and performance guidelines for employees in the sector.

These policy statements and guidelines thus also reflect concern by decision-makers as to the importance and all-pervasive nature of the administrative problems affecting development progress in the agricultural sector, and in other sectors linked to agriculture as well. The various studies made in carrying out the agricultural sector assessment have also confirmed the widespread influence of these administrative problems on development in many of the sub-sectors of agriculture.

High priority should be given to prompt and full-scale implementation of policies and programs already set forth for strengthening the administrative structure and operation of public sector institutions.

Agricultural Research

Policy guidelines in the Fourth Plan recognize the role and contributions of agricultural research to the development of agricultural production, and direct that staff, incentives, and other conditions be provided to encourage scientific research. At the 1977 Agricultural Seminar, policy statements were

adopted which emphasized the need for both strengthening and coordinating agricultural research activities. Many programs and measures on research development were also adopted, which in some cases, renewed earlier recommendations made by international organizations.

It appears, however, that implementation of the policies to strengthen and coordinate agricultural research has continued to lag substantially. Experiment station facilities, in general, remain extremely limited, most stations need new field equipment, and improved staff incentives, as well as opportunities for graduate and post-doctoral training, require attention. More adequate financial resources are thus a high priority requirement for strengthening agricultural research.

The overall development and coordination of research programs requires both a more active role by the Agricultural Research Council, and participation in it by representatives of the various research agencies dealing with agriculture, including those in the Ministry of Agriculture, in the three universities, and in the international groups operating in Syria (FAO, ASCAD, and ICARDA). The participation of farmers is also needed to help identify and indicate priorities on practical problems requiring research attention. In addition, the upgrading and development of a number of strategically located stations into regional research centers is needed, and socio-economic research should be undertaken so as to complement agronomic and animal research, as well as to aid in the planning of the agricultural sector's development.

The formation of a research group in the State Planning Commission for carrying out agricultural economic analyses could provide a strategically located staff of trained technicians that would prepare economic information for national and regional planning purposes in both the public and private sectors. Research studies would seek the optional uses of natural, human and other resources on farms as well as by public agencies and private firms engaged in the marketing of agricultural commodities and inputs. While it would not be responsible for making policy and program decisions, it would provide information on the probable results of alternative proposals to decision makers at National or regional levels.

Agricultural Extension

The essential role of agricultural extension, as an adult educational system designed to transmit research and practical information to farmers and the public, has long been recognized in Syria. However, policy guidelines on its institutional form have fluctuated substantially, and the priority assigned to this supporting service has continued at a relatively low level.

For some 10 years prior to 1979, the policy on dissemination of agricultural technical information was to use the staffs of the many organizations involved with farmers, including cooperatives, Peasants Union, Rural Development Centers, Ghab Project, and State Farms. Then in follow-up to a new policy mandate adopted on the basis of the 1977 Agricultural Seminar, a new Directorate of Extension was created in the MAAR at the end of 1978. The new Directorate has as its primary responsibility the dissemination of new technology to all farmers, and the emphasis in its programming is directed toward achieving the goal of increased agricultural production.

The general thrust of the new policy, and the envisioned increase in the scope and size of the extension services, should contribute substantially to agricultural and rural development. It appears, however, that implementation of the new policy may be unnecessarily handicapped if certain organizational characteristics are continued into the structure of the new Directorate. For example, the programming of extension activities is emphasized at the national and provincial levels where the tendencies always are to stress office work at the expense of field work. Contacts with farmers will probably be minimal, thus making it difficult for extension agents either to affect farmers' behavior or to learn about local conditions. Thus adjustments will be needed to maximize actual contact time with farmers, as well as to provide for adapting the centrally planned programs to take account of local conditions, if such programs are to succeed at the local level.

In addition, the practice of channeling the flow of information between organizational levels through the executive offices at each level appears to result in serious communication overloads at certain administrative points in the system. This problem is compounded by the requirement that other agencies, such as General Organizations and cooperatives, must use the MAAR as their only means of transmitting information to local offices and farmers. More channels of communication must be established between different levels within the MAAR, and outside agencies need to maintain their own parallel linkages to farmers.

Further, the training of agricultural engineers for extension work needs to be significantly re-oriented toward stressing the practical aspects of agriculture. Having practical experience will increase the engineers' competence in the field and in turn raise their confidence, thus increasing their ability for interaction with farmers.

Consideration should also be given in extension policy to moving beyond the solving of farm production problems toward rural community development. Improved quality of rural social services and living conditions will become increasingly important in order to further develop and maintain a strong and productive agricultural sector, as well as to better manage the migratory flow from rural to urban areas.

Agricultural Education

High priority has been given to the establishment of a national system of education from pre-primary to university levels, and to extending educational opportunities to all segments of society. Three distinct levels of institutions provide formal agricultural education: secondary level vocational schools for training skilled and semi-skilled workers; post secondary intermediate institutes for two year training of technicians and paraprofessionals; and university level education to prepare agricultural professionals.

The continuing importance of agriculture in the Syrian economy, plus the emphasis being given to expanding the use of modern technologies in agricultural production, will require increasing numbers of technical field personnel and skilled workers in agriculture. Thus, the role of the secondary schools of agriculture can be expected to grow in importance, and greater priority will need to be given to them by the MAAR. Not only should facilities, equipment and teaching staff be upgraded, but attention should be directed toward a better balance in the overly theoretical curriculum and added stress given to practical problems involved in working with farmers and farmer organizations. At the same time, the training role of the intermediate agricultural institutes is not clear, facilities and staff are inadequate, and enrollments continue at very low levels. But enhancing of the role of these institutes, rather than that of the secondary schools, should this occur, would distort further the manpower ratio between professionals and technicians on the one hand and skilled workers on the other.

The three universities, through their Faculties of Agriculture, offer professional education in agriculture leading to a baccalaureate degree for "Agricultural Engineers", and post graduate programs leading to advanced degrees are beginning to emerge. In considering future directions of agricultural education at this level, it appears that attention should be directed to the admittance procedures which result in many students with little or no interest in agriculture getting assigned to agriculture as a lifetime career. Also, in view of the growing complexity of modern agriculture, consideration should be given to some specialization in the studies at the undergraduate level.

H. Conclusions

Priority of Agriculture. Policy statements on agriculture recognize this sector as playing an essential role in national development plans, and direct that top priority be given to overcoming problems hindering development of its considerable potentials. Nevertheless, the annual development budget allocations made to agriculture during the Fourth Plan have averaged only 57 percent of the amounts needed to meet planned 5-year investment levels, while other sectors received 94 percent as a group. It can only be concluded that investment policy has not provided public resources to the degree required by an agricultural policy calling for priority development of this sector. Considering also that domestic demand for food, based on population growth alone, is projected to double over the next two decades, relative priorities of agriculture in investment policy will need to be substantially raised. In addition, public in-

vestment within agriculture under the Fourth Plan has been heavily weighted toward irrigation development, but increased attention will need to be given to strengthening of institutions that must provide the production inputs and supporting services which are also essential to agricultural development.

Structure of Agriculture. Land tenure policies, implemented through the Agrarian Reform program, have resulted in a large number of land holders with relatively small sized farms, and have accordingly contributed substantially to national equity goals. However, the small size of most farms, and especially the fragmentation of holdings, continues to hinder the use of mechanization and other productivity increasing technologies. Thus attention is needed to devise land tenure patterns that can deal effectively with problems arising from this fragmentation.

Tenure patterns are also characterized by a high proportion of agricultural land under private ownership, but in line with policy statements calling for public sector participation in agricultural production, a number of state farms and production cooperatives have been established. The role of these state and cooperative production units, however, has continued to be relatively small, difficulties with state farms has led to some being converted to research and extensions activities, and interest among farmers in forming more production cooperatives is not generally forthcoming.

Programs to develop service-type cooperatives, on the other hand, have resulted in more than half of all land holders being members of cooperative associations. While the participating members of these specialized and multi-purpose cooperatives retain ownership of their own land, their joint efforts through the cooperatives provide them with benefits in obtaining credit and production inputs, as well as marketing and other services.

Policies adopted to reactivate the private sector of agriculture are to be implemented through pricing, taxation, technical and other incentives, and aim to encourage greater investment of the agricultural sector's savings within the sector itself. It appears that clear cut and active implementation of policy measures such as these relating to privately held land would strengthen the overall economic structure of the agricultural sector and thus would lead to increased production and productivity.

Policies requiring the planning and licensing of agricultural production, along with related policies on pricing and credit, have provided a comprehensive and relatively rigid system for directing the use of agricultural resources. Achievement of production and productivity targets, however, has lagged for many commodities. Variations between planned and actual output may reflect targets based on insufficient data analyses, but it also appears that the implementing programs have too little built-in flexibility to allow farmers to make decisions on adjustments to changing weather and economic conditions that could result in higher production levels.

Natural Resource Development. Policy emphasis has been given to expansion of cultivated land area through major irrigation programs in the Euphrates Basin. However, implementation problems have resulted in modifications toward a more gradual, phased approach. Reassessment of the economic feasibility of land reclamation and development projects will be needed, along with increased attention to management of reclaimed lands and to the economic and social structure required for the full development of the Basin. With regard to rainfed crop land and the steppe rangelands, development policies for these regions will need to continue stressing the expansion of output through productivity-increasing programs, while at the same time giving increased consideration to the protection and conservation of these extensive resources.

In planning the rate and extent of irrigation development to meet national needs for increased agricultural output, it appears that, in the short run, increased attention will need to be given to improving the productivity of existing irrigation facilities and to development of smaller, high-potential irrigation schemes. At the same time emphasis will be needed on increased productivity of the rainfed areas. For the longer run, however, full development and utilization of all irrigation potentials will be essential.

Production Intensification. Policies on intensification of land use to achieve greater production through increased yields can be expected to assume increasingly higher priority since nearly all suitable rainfed lands are already under cultivation, and in the case of irrigated lands, the completion of schemes already planned are expected to utilize the available water resources. Increased productivity, which will require emphasis on the use of "packages" of modern technologies and improved farm inputs, will also require the coordinated participation of numerous institutions to deliver the complete "packages" of services which are essential for an efficient and expanding agricultural production process.

More accurate and detailed data on the scope and potentials of natural resources within the RPUs and PPAs, along with more analyses of farm enterprises in various agro-climatic regions, such as those using the assessment's survey of 1,500 farms, are essential of yield-increasing policies and programs are to be based on full consideration of the costs and benefits involved, both from the standpoint of individual farmer returns and incentives, and as to their impact on agricultural sector goals.

Pricing and Marketing. The use of a fixed pricing policy limits both operational flexibility in marketing operations as well as incentives to expand farm output and improve operating efficiency. Instead of fixed prices, the use of price supports for selected commodities should be considered. Besides protecting farmers against uneconomically low prices, price supports would allow prices to rise more for those products in greatest demand and/or shortest supply, and thus would aid in rational allocation of production and consumption and contribute to increased agricultural output.

Because of the complexities and difficulties in effectively administering the production, pricing and marketing of numerous farm crops, it would appear that concentration on the control of a few major farm crops would be a more fruitful policy direction. In addition, the establishment of a central staff for agricultural economic analysis would be especially useful to decision makers responsible for policies on pricing and marketing which have substantial impacts on the agricultural sector and the national economy.

For improved marketing performance, it appears that policy measures and programs need to more strongly stress efficiency in marketing management and operations of public sector organizations. With regard to private sector marketing, it appears that improvements would result from a clear policy indicating that food retailing is to remain primarily in the private sector, and from government loans and assistance for building new facilities.

Rural Development. Policies and programs established for improving rural life require strengthening not only to achieve equity, but also to slow rural-urban migration and to increase productivity through improved levels of skills, literacy, health and nutrition in the rural population. In addition to improving incomes of farmers and expanding rural non-farm employment opportunities, emphasis is needed on implementing policies to upgrade education, health, and other social services for all rural residents. The substantial improvements made over the past decade and a half have favored the urban areas, and higher priorities will be required in development expenditures to further reduce the gaps, especially for education and health.

With large numbers of ministries and agencies responsible for implementing programs that provide education, health and other services to rural areas, problems of coordination, duplication and gaps will need continuing attention if improved rural levels of living are to be achieved. Rural Development Centers appear to provide a potentially useful structure for both physically and administratively bringing together the mix of programs and services needed for rural development, especially if programs and services are more closely tailored to local conditions. Agro-ecological zones (RPUs) should be explored as to their potential for the planning and implementation of social service programs.

Population growth in Syria is at very high levels, with little evidence for an impending decline. In addition with fertility rates especially high in the rural sector and farm employment declining due to greater use of modern technology, problems of rural-urban migration and of non-farm employment will be intensified. To minimize these impacts, policy options need to be reviewed on developing an active program that will make family planning available to all on a strictly voluntary basis to those desiring smaller families.

Institutional Support. The structure and administration of public institutions, ranging from central ministries to village level units, bear directly on the effectiveness with which the complex of agricultural development policies and programs are coordinated and implemented. Because of the importance and all-pervasive nature of these administrative problems, high priority should be given to prompt and full-scale implementation of policies and programs already set forth for strengthening the administrative structure and operations of public sector institutions.

Policy statements recognize the contributions of agricultural research to expanded agricultural production, and emphasize the need to both strengthen and coordinate agricultural research activities. However, implementation has lagged and high priority is needed on more adequate financial resources. Coordination requires a more active role by the Agricultural Research Council, and participation in it by representatives of the various research agencies dealing with agriculture. Participation by farmers is also needed to help identify and indicate priorities on practical problems needing research attention. Upgrading and development of regional research stations is needed, and socio-economic research should be undertaken so as to complement agronomic and animal research.

The newly established policy on extension should contribute substantially to agricultural and rural development, but effective implementation will require attention to maximizing actual contact time of practically-trained extension agents with farmers, and to adapting centrally planned programs to take account of local conditions. More channels of communication need to be established between different levels within the MAAR, and outside agencies need to maintain their own parallel linkages with farmers. Consideration should also be given to moving beyond solving of farm production problems toward rural community development.

Syria: Agricultural Sector Assessment

Volume 1: Summary Report

CHAPTER VIII

SECTOR DEVELOPMENT RECOMMENDATIONS

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CHAPTER VIII

SECTOR DEVELOPMENT RECOMMENDATIONS

The agricultural sector has made major progress in the past decade in spite of many problems which still persist. The future challenge of meeting demands for agricultural products and of fulfilling agriculture's role in overall development is formidable. Population is increasing sharply, almost doubling since 1960, and expected to almost double again by the year 2000. Real per capita income also has risen substantially with the result that the increase in total demand for agricultural products has considerably exceeded the rise in population. With further increases in income expected, total demand is projected to exceed the 1975 base by about 60 percent in 1985 and by about 195 percent in 2000.

Agricultural production also has increased, particularly since the mid seventies, but has continued to lag behind the increase in total demand. After experiencing a period of stagnation during the sixties when per capita production fell by 20 percent, total agricultural production has risen by about 50 percent and per capita production by about 25 percent. However, per capita production in the late seventies was still only about equal that of the early sixties. In spite of the very substantial improvement in recent years, the gap between production and demand has continued to widen. To fill this gap, exports of agricultural products have been reduced and imports increased. The agricultural trade balance has shifted from a modest surplus in the early seventies to a very large deficit in recent years.

A. Investment in Agricultural Development

The response of the agricultural sector to the increased demand was, and still is, limited by a number of constraints, of which one has been limited financial support for agricultural development. The Fourth Five-Year Plan included SL 10.9 billion for development programs directly related to the agricultural sector. Of the total planned budget for agriculture, about 83 percent was for the Euphrates dam and basin development and other irrigation projects, and only 17 percent, or about SL 1.9 billion, was for all other agricultural programs and projects. In addition to the planned expenditures in the agricultural sector directly, SL. 6.1 billion was included for investments in farm input and commodity marketing programs related to agriculture. Although the total amount of planned investments directly in the agricultural or closely associated sectors may have been in line with their relative importance in generating Gross Domestic

Product and with existing priorities, the SL 1.9 billion planned for all non-irrigated related programs appears very inadequate in view of the problems facing the sector and the role which stated policies and goals indicate the sector should play in overall development.

The problem of limited planned investment in agriculture was made more serious by the fact that only a small proportion of the planned investment was actually allocated and expended as the plan progressed. At the end of the fourth year of the Plan only 57 percent of the planned average had been budgeted for agriculture compared to 94 percent for all other sectors. Actual expenditures in agriculture at the end of the third year were only 31 percent of the planned average compared to 63 percent for all other sectors.

Although the overall Plan may have been inadequately funded and/or overly ambitious as to targets, the major problem appears to have been in implementation. In any case farmers did not have the full complement of physical inputs, technical information and support services needed to expand production fully, and the projected accomplishments of the sector through 1980 fall far short of planned levels. Only 43 of the 248 thousand hectares planned to be prepared for irrigation in the Euphrates Basin are expected to be completed by the end of 1980 and only 33 of 135 thousand hectares planned to be irrigated and in cultivation are expected to be in production.

Comparable short-falls are expected in most of the other intermediate land and water targets. Likewise projected increases in production of cereals, food legumes, oil crops, sugar beets and feed crops fall far short of planned levels. However, increases in fruits, vegetables and animal products are expected to be much closer to plan targets.

These circumstances suggest that consideration be given to the following policy directions in formulating the Fifth Five-Year Plan.

1. Increase total investment funds for developing the agricultural sector so as to provide for:

- a. Improving the productivity of existing irrigated and rainfed cultivated areas that are in need of improved drainage, erosion control, breaking of impervious layers, or other modifications;

- b. Completion of technically and economically viable irrigation projects already planned or underway;

c. Increasing the supply and improving the distribution to farmers of such productivity-increasing inputs as fertilizers, pesticides, equipment and improved seed;

d. Strengthening research and extension/demonstration programs in order to make available to farmers the technical information necessary to increase productivity;

e. Providing adequate storage and other marketing facilities and initiating programs to increase the efficiency of marketing organizations; and

f. Reducing inequities between rural and urban people in their access to education, health and other social services affecting levels of living.

2. Establish and strengthen organizations and programs responsible for agricultural sector analysis and planning by:

a. Developing a technical staff within the State Planning Commission that will provide an adequate data base and information system as well as the analytical capabilities essential for overall planning of the agricultural sector. Much pertinent information has been developed, but it needs to be brought together in a systematic manner and arrangements made for its ready access to all users. Arrangements are also needed for filling information gaps; and

b. Initiating a more vigorous program for the review and evaluation of proposed projects in order to establish realistic implementation schedules and to identify in advance, to the extent possible, problems likely to impede project development. While the technical and economic feasibility of some proposed projects have been evaluated, others have not. Past experiences suggest that all projects, even those that have been evaluated earlier, should be carefully re-evaluated before initiation of work to assure that they are currently viable.

3. Strengthen administrative structure and operations of both national and local public institutions in the agricultural sector by:

a. Directing attention to achieving greater coordination and cooperation among agencies, avoiding duplication of activities, setting standards of performance in public sector organizations, improved organizational structure of administrative staff and incentives for, and training of personnel; and

b. Revising implementation and monitoring procedures to assure closer compliance between planned and actual progress in the agricultural sector. Although progress is reviewed annually, causes of short-falls are not clearly identified nor are steps taken to solve problems impeding progress. When unforeseen problems arise or priorities change, plans should be modified to reflect the new situation.

The following sections present specific steps for consideration in the planning and implementation of investments for expanded agricultural development. Many of the issues involved were studied by the groups participating in the 1977 Agricultural Seminar, and the assessment specialists are in general agreement with the recommendations adopted at the end of the Seminar. Many of the recommendations that follow coincide with the findings of the Seminar groups, but additional recommendations, along with more specific details, are also presented.

B. Adjustments in Land Use

Land in Syria was classified, as of 1978, into the following broad categories through the interpretation of remote sensing imagery: Intensive Agriculture (major areas receiving full or supplementary irrigation and with multiple cropping potentials) 683,000 ha; Extensive Agriculture (areas in rainfed crops, fallow or orchards and with no potential for multiple cropping unless irrigated) 5.2 million ha; and Other (areas devoted to range, forest or non-agricultural uses) 12.8 million ha.

Increases in agricultural production may be achieved through investments to improve the productivity in each of these categories, as well as through shifts of land in some categories to more intensive uses. Maintenance of long-term productivity will require shifts of some land now used for extensive agriculture into non-crop uses.

Intensive Agricultural Areas

About 3.6 percent of the total land area is classified as being intensively cultivated, and of this area about 95 percent is judged to have medium to high potential for continued intensive use and multiple cropping. However, the intensity ratio (the ratio of the area of irrigated crops actually grown to the total irrigated area available for growing such crops) averaged only 1.07 for the nation in 1975-77. Though the average ratio has increased moderately over the past decade, its continued low level indicates that only very limited multiple cropping is being practiced.

The medium to high potential of this land for continued intensive use, as well as the existing large investments and established water rights, clearly indicate that changes in general uses are neither desirable nor feasible. In addition, it does not appear that lack of suitable land will be a constraint to expanding the area of irrigated crop production. There is sufficient soil with suitable characteristics to increase the area of irrigated land to the full extent that the supply of irrigation water will permit. Even the full development of the Euphrates Region itself, and other projects in the general area, will not begin to exhaust the land within the general area that is suitable for development of irrigated crop production. There are extensive areas in other type-of-farming regions which could also be developed if irrigation water were available.

Steps to increase productivity of currently irrigated land are likely to provide the most rapid increase in total production and should be given high priority in the Fifth Five-Year Plan. However, in order to meet longer-run needs, it is essential that the irrigated area be expanded to the greatest extent possible.

The following recommendations relate to the planning of future development of irrigated production.

1. Give first priority to inclusion of funds in the Fifth Five-Year Plan for completion of projects already proposed for renovating and improving existing irrigation facilities and networks. Most of the proposed projects were included in the Fourth Five-Year Plan, but because of lack of funds or for other reasons were not fully implemented. Completion of these projects would increase the supply of water and reduce seasonal and annual variability in existing irrigated areas. This would reduce the major constraint to multiple cropping and would be a major step toward attainment of the 1.60 to 2.00 intensity ratio goal. The private sector could be encouraged to participate in attaining this goal by providing at least partial funding through government loans for installing additional pumps in existing irrigated areas for supplemental irrigation.

2. Initiate new detailed studies or re-evaluations of the technical and economic feasibility of increasing productivity through improved drainage in most of the irrigated areas but particularly in RPU 10 (Southwest Region); of breaking the impervious layer underlying the irrigated areas in RPUs 48 and 49 (Undulating Plains Region); and of providing soil amendments to improve the structure and modify the alkaline and saline conditions on the terraces above the Euphrates floor in RPU 32.

3. Provide technical assistance to farmers for increasing the on-farm efficiency of water use by improving water distribution systems in individual fields, including improved ditch layouts, lining of ditches, control of weeds, land levelling, and installation of sprinkler systems where feasible.

4. Establish a pricing system for irrigation water use that would provide incentives to individual farmers to utilize water more efficiently. Providing irrigation water free of charge or at low standardized charges to all farmers in a project area encourages wasteful use of water. It does not appear feasible in the near future to relate charges for water from public networks to measured amounts of water used. However, it would be feasible to establish charges more nearly reflecting cost of providing water and to adjust per hectare charges for farmers adopting water conserving practices.

5. Proceed as rapidly as technical and economic feasibility studies are completed with development of all viable new irrigation projects. The decision to at least postpone development in RPU 42 (Euphrates Region) and to further evaluate alternative areas appears to be fully justified.

Extensive Agricultural Areas

Land classified as being used for extensive agriculture, which includes rainfed crops, fallow and orchards, accounts for about 27 percent of the total land area and for about two-thirds of all crop production. The total area has trended moderately upward, and the intensity ratio (the ratio of the area in rainfed crops to the area available for the production of such crops, including fallow) averaged 0.63 during the 1975-77 period, a dramatic increase compared with an average of only 0.45 during 1968-74.

About 2.0 million of the 5.2 million ha of these lands are in areas receiving 300 mm or more of rainfall and are judged to have medium to high potential for continued rainfed crop production. With moderately good management practices, the productivity of this land can not only be maintained but also increased. No change in use of this land is indicated, except in instances where portions of it could be irrigated and more intensive use attained.

An additional 1.7 million ha of extensively cultivated land lying in areas which average only 250-300 mm of highly variable rainfall annually have only low potential for rainfed crop production. This land can be maintained in extensive agricultural uses, but because of the limited rainfall there is only limited possibility of increasing yields and returns.

There are about 1.5 million ha currently used for extensive agriculture that are judged to be unsuitable for such use. Conversion to range, pasture or woodland appears to be the most suitable use.

An estimated 296,000 ha of non-cultivated land scattered through all regions could be converted to rainfed crop production, but potentials are rated as medium or low.

Recommendations for the future use of land now extensively cultivated are as follows:

1. Retain the 2.0 million ha with high to medium potential for rainfed crop production in that use, but continue and strengthen efforts to increase intensity of use and to improve structure and productivity of the soil. Further substitution of forage legumes for fallow would help meet the urgent need for forage, and the crop residue would increase available water and plant food capacity of the soils. The limited information available indicates that substituting legumes for fallow will not reduce significantly subsequent yields of grains or other crops in the rotation, even in the short-run, and in the long-run will increase yields. Farmers will need assistance in acquiring, and technical guidance in using, machinery for effective forage production.

2. Retain, at least in the short-run, the 1.7 million ha with low potential for rainfed cultivation in that use, except in those areas that might be converted to irrigated production. Over time some producers may find the low and irregular yields and income to be derived from these areas to be unacceptable. With the greater than average increase in demand for livestock products, the prices of these products may be expected to increase relative to prices for crops now produced on this marginal land. At that time government programs to assist in converting such land to range uses would be desirable. Such programs might involve loans to assist operators in establishing cool season perennial grasses and semi-desert shrub cover such as Atriplex, and in acquiring livestock to utilize the restored range. The program should also provide for extension of technical information necessary for successful conversion. Prior to initiation of such a program, research and field testing should be undertaken to determine the most suitable species of grasses and shrubs for each area.

3. Convert as rapidly as possible the 1.5 million ha not suitable for continued rainfed crop production to less extensive use. This would include the following: convert to woodlands the 69,000 ha of highly erosive land with slopes of 15

percent or more and over 300 mm of annual rainfall, in the Southwest and Mountain Regions and in adjoining transitional areas. Reforestation of some of this area has already been initiated but generally has not reached a stage of development that could be distinguished on the remote sensing imagery; convert to pasture the 481,000 ha in the Undulating Plains with gentle slopes receiving 250 mm or more of annual rainfall, but generally comprising shallow soils with impervious sub-soil layers; and convert to range use the 707,000 ha in the transitional zones between the Steppe and adjoining areas in the Northeast and Southwest which receives less than 250 mm of annual rainfall.

Other (Non-Crop) Land

The remaining 12.8 million ha not used for crop production includes 130,000 ha identified from the remote sensing imagery as being covered by water or urban development and 150,000 ha of woodland or forests. About 12.5 million ha is used for grazing. Most of this land lies in the very low rainfall areas of the Steppe and adjacent regions. However, it includes about 580,000 ha in the higher rainfall regions in the western part of the country. Of this amount, an estimated 180,000 ha has high or medium potential for rainfed crop production. Most of the remaining 400,000 ha in the high rainfall area now being grazed has scattered woodland growth and is probably included as forest land in the statistical reports. Most of this latter area is subject to severe erosion and its best use would be for forest production. About 280,000 ha lying in the Euphrates Region has high or medium potential for irrigated crop production and is expected to be converted to that use. Limited additional areas in other regions might also be converted to irrigated crops.

The following suggestions are offered for considerations in planning the future use of the 12.5 million ha now being used for grazing.

1. Convert land with high or medium potential for irrigated crop production lying in areas where irrigation water is available to irrigated use as rapidly as possible. This would include the 280,000 ha in the Euphrates Region now used for grazing plus additional areas in other regions that could be irrigated from the Euphrates or from any other long-term sources of water.
2. Initiate feasibility studies of converting the 180,000 ha now used for range or woodland but with high to medium potential for rainfed crops located primarily in RPUs 2 and 5 in the Southwest, RPUs 29 and 34 in the Lowlands and RPU 38 in the Undulating Plains. If viable, initiate projects to accomplish this conversion.

3. Initiate programs to eliminate grazing and establish woodlands on the 400,000 ha of highly erosive soils in the high rainfall areas of the West. In the long-run, forest based industries should provide expanded employment and incomes for people in these areas but in the short-run, people now depending on grazing of livestock will be displaced and will need assistance in finding other employment and sources of income.
4. Retain the remaining 11.75 million ha in range or grazing lands. The plant cover on this land has deteriorated and its productive capacity seriously impaired. Improvement in the quality of this resource will require control of grazing and establishment of other improved range management practices that are discussed in subsequent sections of this chapter.

C. Water Resource Development

The expanding demand for food and other agricultural products in the coming decades will require that even greater emphasis be given to the development and full utilization of the nation's water resources. Priorities on the direction of water resource development will need re-evaluation since hydrologists advise that the completion of the water development programs now planned will essentially harness all of the surface water and spring flows above the reservoirs, except possibly the Euphrates River. Depending on the present redevelopment project under study, some spring flow waters would still go to the sea from the Orontes River.

Thus, except for the Euphrates project and one or two smaller projects, improved water use efficiency may be the major opportunity to enlarge the effective water supply in Syria. As indicated in the preceeding section on Adjustments in Land Use, measures and investments involved here would relate to renovation of canals, rehabilitation and reorganization of irrigation networks, reduction of evaporation, improved water management, and introduction of technologies such as sprinkler irrigation.

Groundwater resources are not well identified or described, especially with regard to annual replenishment and use. With improved information, a much needed integration of surface and ground water supplies and uses could be achieved.

Public irrigation development programs have been largely oriented toward construction of large-scale irrigation networks. However, these networks do not include a large portion of the total land area classified as irrigated. A careful review and analysis may be useful as to whether public funds are being too heavily allocated to large projects with associated inadequate attention being given to other needs and opportunities.

An essential step required for successful development of irrigated agriculture in the Euphrates project seems to be the rapid and complete pre-development of farm land, farm irrigation systems and drainage. The pre-development program should also be accompanied by a rigorous education program for settlers and managers.

A major need exists for an enlarged program in research and education relative to irrigated agriculture. Economic, agronomic, and engineering research are needed along with associated programs to extend research results to farmers and irrigation managers and administrators. Improved statistics are needed, and data on all irrigation water supplies and use need to be incorporated into the Resource Planning Unit (RPU) system.

D. Range and Sheep Development

The Steppe region encompasses over half of the land area of Syria. Although unsuitable for rainfed crop production, utilization of the range land in the region for sheep production makes it one of the major agricultural resources of the Nation. Steps have been taken by the government to protect the range and improve the level of living of people in the region. However, there is clear evidence that deterioration of the range is continuing and may even be accelerating. The level of living of people in the region appears to have improved but still continues below that of people in other rural areas. The following measures are proposed as means of alleviating these conditions.

An organization for Steppe Development should be established as soon as possible to coordinate the planning and implementing of the many programs designed to provide technical and social services to the Steppe. The organization should be similar to the General Administration for the Development of the Euphrates Basin in its organizational structure and function. The scope of its activities should include not only the technical activities relating to range improvement and sheep production but also input and commodity marketing and the provision of social services.

A program to provide sound range management for the entire region should be initiated in the Ministry of Agriculture and Agrarian Reform at the earliest possible date. It is suggested that the Steppe be divided into several Grazing Management Areas each having similar soils, vegetation and climatic conditions. The 10 RPU's, designated as the Steppe region might be used as the basis for delineating the Grazing Management Areas. A staff of range and animal husbandry technicians should be recruited and trained to serve each Area. The staff would be responsible for developing grazing plans specifying the number of sheep and time allocations for grazing under average, above average and below average rainfall conditions. The staff would issue permits for grazing according to the grazing plans developed and be authorized to revoke permits of violators. The staff would also provide technical guidance to sheep producers.

The programs of the Range and Sheep Stations located in the Steppe should receive added financial support and direction to strengthen staff and expand research activities. Added research emphasis should be given particularly to the study of flock management, optimum stocking rates, plant response to variable grazing practices, and to plant palatability and feed values.

The establishment of a Mohafaza encompassing only the Steppe region would facilitate the functioning of the Steppe Development Organization and the Range Management Program. Currently any organizational unit concerned with any part of the development of the region must deal with many Mohafazat governments all of whom are more concerned with crop production and with people in the more humid areas than with range and sheep production and the people living in the Steppe. A Mohafaza concerned only with the region would allow the local government officials to become more familiar with the needs and customs of the population, concentrate on its special resource problems, and elicit more contacts, understanding and active support of the people in the area.

E. Production Intensification

Policy on intensification of land use can be expected to assume increasingly higher priority as it becomes the major means available for achieving the goal of expanded agricultural production. Nearly all of the suitable rainfed lands are already under cultivation, and so yield increases are the main route to greater output. In the case of irrigated land, the completion of schemes already planned are expected to utilize the available water resources, and so more intensive utilization of irrigated areas will also become increasingly essential. Thus development

planning and agricultural investment, which have been stressing major schemes for expanding irrigated areas, will need to be oriented more and more toward the complex of measures and programs required for land use intensification.

Greater production via increased yields will require increased emphasis on measures and programs that introduce, or expand the use of, modern agricultural technologies and improved farm inputs. In many cases, these technologies and inputs are complementary and must be introduced as a "package" if they are to have value in increasing yields beyond those attainable when one or more of the components is missing. In like manner, the introduction of yield-increasing technologies also requires the coordinated participation by numerous institutions so as to deliver the "package" of services which are essential for an efficient and expanding agricultural production process.

The expanded use of certain productivity-increasing technologies, such as mechanization, continue to be hindered by the small size of most farms, but especially by the fragmentation of holdings. Attention is needed to devise land tenure patterns that can deal effectively with problems arising from this fragmentation. Consideration should be given to the use of extensive village level discussions where farmers can make direct contributions to the working out of innovative and suitable solutions. Government loans could also be provided to assist in the process of land consolidation.

Clear-cut and active implementation of policy measures adopted to renew and improve the private sector of agriculture would strengthen incentives for increasing productivity. Through pricing, taxation, technical and other incentives, these measures should encourage greater investment of the agricultural sector's savings within the sector itself. It also appears that in the implementation of the annual agricultural production plan there is too little built-in flexibility to allow farmers to make decisions on adjustments to changing weather and economic conditions that could result in higher production levels. More and earlier participation of farmers in the formation of production goals should also be encouraged.

In addition to coordination of activities by the various institutions affecting the agricultural production process, availability of basic data on the scope and potentials of the nation's natural resources is essential in order to develop and refine the policies and programs that guide the land use patterns and farming systems of the agricultural sector.

Because of the variability in soil types and climatic conditions in Syria, as well as the need to conserve resources and maintain ecological balances, the natural resource data should be as detailed as

possible, and should preferably cover relatively small and homogeneous areas. Thus additions to, and refining of, the computerized natural resource data base that has been developed through the delineation of RPU's and PPAs and use of satellite imagery should be made in the future to expand its usefulness in planning agricultural productivity increases.

Detailed and continuing economic analyses of farm enterprises in the various agroclimatic regions of the country are also essential if policies and programs on yield-increasing technologies and inputs are to be based on full consideration of the costs and benefits involved, both from the standpoint of individual farmer returns and incentives, and as to their impact on agricultural sector goals. The detailed economic data obtained from the 1,500 farmers surveyed as a part of the agricultural sector assessment provide a current source of such information. These results provide some explanation for the relatively low yields in Syria and indications of measures that might be taken to increase productivity.

Fertilizer is used extensively only on rainfed and irrigated vegetables and irrigated cotton, wheat, and sugarbeets. A substantial portion of the irrigated wheat was of local varieties. Fertilizers were seldom used on rainfed crops other than vegetables even in high rainfall areas. Yields generally showed a high positive response to increased fertilizer applications but the range in amounts applied was too narrow to provide a measure of the optimum amounts for the different regions of Syria. However, the amounts used in practically all instances were well below what are considered optimum amounts for crops grown under similar conditions in other parts of the world. Applications on cotton were closer to these indicated optimums than were those on other crops.

Herbicides were used extensively in cotton production, particularly by those holders reporting the highest yields. However, use of herbicides were seldom reported in producing other crops, even Mexican wheat where such use is considered to be essential for good weed control and attainment of high yields.

Seeding rates of cereals differed substantially between fields producing the highest yields and those producing the lowest. In most areas the differences ranged between 20 and 30 percent but in a few areas the rates differed by as much as a hundred percent.

Rotations differed among regions but little variation among holders was reported within a region. Irrigated land was planted in a crop each year in practically all cases but occasionally producers reported that land now in irrigated production had been fallowed at least once in the past four years. The most frequent rotation for rainfed cereal production was still to fallow the land two

out of four years and produce wheat or barley in the other two years. A much less frequent rotation was to fallow three out of four years and to plant cereals in the fourth year. Also a very small proportion reported producing a crop each year alternating grain and chickpeas or lentils. Only an extremely small proportion of the rotations included a forage legume.

Those results point up the need of several measures to increase yields and thereby increase total production:

Increase the availability and encourage the use of greater amounts of fertilizer. Although optimum amounts are not firmly established for each area, it is extremely unlikely that the increases in use that can be achieved in the next five years will even attain, let alone exceed, the optimum;

Make available the necessary inputs of seed, fertilizers and pesticides and encourage farmers to substitute Mexican for local varieties on all irrigated wheat land and on rainfed land receiving 500 mm or more of rainfall;

Promote through extension workers or others an increase in seedling rates for cereals up to the levels being planted by the producers in each area who are achieving the highest yields. Survey results provide indications of those levels for each area;

Increase efforts to persuade farmers to further intensify the use of existing crop land by converting fallow to the production of a leguminous crop which would both increase total production and reduce the need for purchased nitrogen fertilizers;

Develop, as rapidly as the research program can be expanded and results obtained, measures of the optimum rates of fertilizer application, seeding rates and cultural and irrigation practices for each major crop and producing area;

Develop field test and demonstration fields as rapidly as research results are available (1) for determining consistency of research plot experimental results and results to be expected under normal farming conditions and (2) to provide an opportunity for farmers to observe the effects of different cultural practices when applied independently and in combination.

F. Pricing and Marketing

In view of the comprehensive planning, licensing and pricing of agricultural products, along with substantial public sector participation in the operations of the marketing system, it may be that government has become too involved in these activities with resulting counter-productive effects on efficiency and investment in agriculture. Suggested modifications follow.

The use of a fixed pricing policy limits both operational flexibility in marketing operations as well as incentives to expand farm output and improve operating efficiency. Instead of fixed prices, the use of price supports for selected commodities should be considered. Besides protecting farmers against uneconomically low prices, price supports would allow prices to rise more for those products in greatest demand and/or shortest supply, and thus would aid in rational allocation of production and consumption and contribute to increased agricultural output. Benefits of price supports are proportional to farm size, and since many farmers have relatively little to sell, other methods of income support, such as direct payments, can be utilized.

Because of the complexities and difficulties in effectively administering the production, pricing and marketing of numerous farm crops, careful analysis at a large volume of data is required. The establishment of a central staff for agricultural economic analysis would be especially useful to decision makers responsible for policies on pricing and marketing which have substantial impacts on the agricultural sector and the national economy.

For improved marketing performance, it appears that policy measures and programs need to more strongly stress efficiency in marketing management and operations of public sector organizations. With regard to private sector marketing, it appears that improvements would result from a clear policy indicating that food retailing is to remain primarily in the private sector, and from government loans and assistance for building new facilities.

Subsidies can provide incentives for increasing and reallocating production, as well as support farmer's and consumer's incomes, but their costs, as well as their impact on economic efficiency, can be very substantial. It appears that the cost of direct and operating subsidies is relatively large in Syria, and can be expected to continue growing. Also, the more reliant Syrian agriculture becomes on subsidies, the more maladjusted it becomes relative to both domestic and international supply and demand conditions. Careful analysis is needed of subsidy dependence on a crop by crop basis, as well as of subsidy costs and their burden on various segments of the population.

Following are recommendations relating to the marketing of specific commodities and inputs.

Fresh fruit and vegetables marketing has performed reasonably well and marketing margins have remained relatively low. It appears that there is no need for price controls at any level on these products, since there is sufficient competition to protect

producers and consumers. Government efforts could best be directed at developing grades and standards, maintaining competition, fostering desirable trading practices and dissemination of market news. A project to cooperate with other Arab countries to develop uniform grades and standards for fruits and vegetables would greatly facilitate trade.

In cereal marketing, handling efficiency is poor because of lack of bulk handling. Local bulk storage such as metal and/or concrete bins to start the bulk handling process and reduce the peak demands on truck transportation is needed. A detailed study is needed to estimate the number, size and location of this local storage.

Commercial food processing is mostly operated by government. Most plants appeared to be well operated where decisions were under control of the local manager, but lack of flexibility in employment, procurement and marketing policies result in inefficiencies and idle capacity. Management programs to increase training, delegate authority, improve accountability and evaluate performance are badly needed.

Cotton marketing is an efficient and well performing government monopoly. There is opportunity to improve labor productivity by moving toward machine harvesting. Most of the changes must come at the farm level, but close coordination with The Cotton Marketing Organization (CMO) is needed to handle the machine harvested cotton.

Livestock market facilities in Syria consist mostly of a place where sellers can bring livestock for sale. The basic facilities for a modern well organized livestock market should be provided in each place where substantial trading occurs. A study to provide a basic design and organization for a model market would be a good investment.

Syria is in a strategic position as to sheep marketing in the Middle East. Demand for meat will grow rapidly in the future. There was surprising little market organization and market coordination in livestock and meat marketing, processing and distribution. A Sheep Marketing Board or a Livestock-Meat Marketing Board could be established to coordinate, establish policies, and produce market information that would be useful in improving performance in livestock meat marketing.

Despite only two modern livestock slaughter plants in Syria, these plants have underutilized capacity; and the sanitation and quality they are designed to produce is not being fully utilized because of management and administrative problems. A board with authority to study and carry out policies to improve performance of these systems should pay large dividends.

Butcher shops and meat stores are generally very inefficient with low labor productivity mainly because they lack adequate space and facilities. Government could design and build modern facilities and lease these to private operators on a competitive bid basis. There are adequate skills and competition in the private sector. Government's role should be to set grades and standards and enforce them.

Poultry meat and egg production and marketing is among the best performing industries in the agricultural sector. There is sufficient competition, and with the government being an important producer and marketer, price controls are unnecessary. Additional expansion of government facilities appear to be unnecessary. For poultry production units, which require some size in order to be efficient, there is need for study to determine how important size of production is for increasing production efficiency, and then encourage such scale of enterprise.

Dairy marketing is mainly in the hands of small private producers and operators although the government operates three modern plants, all of which are under-utilized due to administrative management, and marketing problems. Syria is a dairy products deficit country and this is likely to continue as it does not have the necessary production resources to economically produce all of its needs. This is such an important food group for good nutrition, that a national study is needed to examine the total dairy marketing, trade and price policies to provide improved performance of the national dairy industry.

The sugar program needs a thorough examination in terms of the costs of producing sugar domestically versus importing. Frequently, imported sugar is cheaper than that produced in SAR. FAO projections to 1985 indicate plentiful world supplies and reasonable prices.

While the Agricultural Cooperative Bank has increased medium and long terms loans significantly, short-term loans to farmers have declined sharply. Because most short-term operating loans have a high pay-off for producers, more adequate funds should be made available to expand this type of lending. Also, since the ACB is able to meet the loan requirements of larger borrowers, a program should be developed to inform the more productive private operators and cooperatives regarding the flexible lending limits permitted within present policy. To avoid subsidizing these growers, consideration should be given to further increasing interest rates when the loan exceeds some point, say SL 100,000 or 150,000, to a rate more nearly approximating the free market level. Consideration should be given to increasing the flexibility of the loan program to permit larger loans to farmers with greater capability for using more credit effectively. Until other measures of capability can be developed, in-kind credit might be allocated among farmers according to the previous year's yield.

In the marketing of physical inputs, storage capacity for feed grains is not adequate at present and will continue to be a problem unless some affirmative action is taken. Additional storage facilities should be built for fertilizers and seeds, but the most critical need is in the area of feed grains. Also, a study is needed on the economic feasibility of building bulk handling facilities at the ports for both imports and exports of agricultural inputs. Bulk handling facilities would not only decrease labor and materials costs, but would also enable faster delivery of inputs from the ships to the farmers. A transportation study to determine the most efficient means of fertilizer distribution would assist in identifying the adequacy of the current distribution system. This information is particularly important with the construction of new fertilizer plants and their expanded output. Construction of the proposed chemical formulation plant in Syria would be of benefit to the farmers of the country if the results of the technical and economic studies show such construction to be feasible. The expanding demand for application of pesticides indicates a need for increasing government or private equipment for this purpose.

G. Improving Rural Levels of Living

Policies and programs established for improving rural life require strengthening not only to achieve equity, but also to slow rural-urban migration and to increase productivity through improved levels of skills, literacy, health and nutrition in the rural population. In addition to improving incomes of farmers and expanding rural non-farm employment opportunities, emphasis is needed on implementing policies to upgrade education, health and other social services for all rural residents. The substantial improvements made over the past decade and a half have favored the urban areas, and higher priorities will be required in development expenditures to further reduce the gaps, especially for education and health.

With large numbers of ministries and agencies responsible for implementing programs that provide education, health and other services to rural areas, problems of coordination, duplication and gaps will need continuing attention if improved rural levels of living are to be achieved. Rural Development Centers appear to provide a potentially useful structure for both physically and administratively bringing together the mix of programs and services needed for rural development, especially if programs and services are more closely tailored to local conditions.

Population growth in Syria is at very high levels, with little evidence for an impending decline. In addition, with fertility rates especially high in the rural sector and farm employment declining due to greater use of modern technology, problems of rural-urban migration and of non-farm employment will be intensified. To minimize

these impacts, policy options need to be reviewed on developing an active program that will make family planning available on a strictly voluntary basis to those desiring smaller families.

More attention should be given to the collection and analysis of demographic data, not only to further develop basic indicators of population characteristics and trends, but also data needed to quantify and analyze internal and external migration, as well as factors affecting fertility rates.

With migration from rural to urban areas expected to continue, even if on a reduced level, training programs in rural areas should be modified to include training to better fit rural people for employment and living in an urban environment.

Slowing of migration from rural to urban areas will require added emphasis on creating non-farm rural employment opportunities - both full time and seasonal. Seasonal shortages of farm labor might be eased if the activities of existing employment agencies were expanded to include placement of farm workers on a short term basis. Also a separate government agency operating on a national scale could facilitate recruitment and placement of farm laborers who could travel from one region to another as demands for labor shifts. Further mechanization particularly of cotton and sugarbeet harvesting could also help to relieve seasonal labor shortages if problems related to cultural practices and land holding patterns which limit mechanization can be solved.

Future planning for utilization of labor would benefit if more information were available on the farm labor situation. Such data could provide more detailed and accurate analysis of underemployment and labor shortages for small geographical areas, and could be collected on a continuing basis to provide current information on trends. While data is available on persons in occupations that process or market agricultural products, there is a need for similar data for the farm input industry.

Although it appears that food supplies, on the average, are sufficient to provide nutritionally adequate diets, data are not available on the distribution of nutrients, and the Ministry of Health survey indicates the existence of malnutrition in some segments of the population. To put planning and implementation of nutrition programs on a firmer basis will require increased attention to nutrition data, including a system of monitoring the availability and distribution of nutrients in the various areas of the country.

The current policy of bringing the Bedouin into the mainstream of Syrian life offers more options to these mobile people. Innovative efforts, most importantly the Range and Sheep Improvement Cooperatives Program, seek to improve range productivity, but at the

same time could be modified to provide a means for delivery of social and marketing services to semi-nomadic people. Continuing attention should be given to these policies and programs. In addition, research will be needed to find solutions to major problems still unsolved, including how to control flock size and how to allocate and regulate the grazing of sheep by both individuals and groups.

H. Strengthening Institutional Support

The structure and administration of public institutions, ranging from central ministries to village level units, bear directly on the effectiveness with which the complex of agricultural development policies and programs are coordinated and implemented. Because of the importance and all-pervasive nature of these administrative problems, high priority should be given to prompt and full-scale implementation of policies and programs already set forth for strengthening the administrative structure and operations of public sector institutions.

Policy statements recognize the contributions of agricultural research to expanded agricultural production, and emphasize the need to both strengthen and coordinate agricultural research activities. However, implementation has lagged and high priority is needed on more adequate financial resources. Coordination requires a more active role by the Agricultural Research Council, and participation in it by representatives of the various research agencies dealing with agriculture. Participation by farmers is also needed to help identify and indicate priorities on practical problems needing research attention. As indicated in previous sections, financial support for upgrading and development of regional research stations is needed, and socio-economic research should be undertaken so as to complement agronomic and animal research.

The newly established policy on extension should contribute substantially to agricultural and rural development, but effective implementation will require attention to maximizing actual contact time of practically-trained extension agents with farmers, and to adapting centrally planned programs to take account of local conditions. More channels of communication need to be established between different levels within the MAAR, and outside agencies need to maintain their own parallel linkages with farmers. Consideration should also be given to moving beyond solving of farm problems toward rural community development.

With emphasis being given to expanding the use of modern technologies in agricultural production, increasing numbers of technical field personnel and skilled workers will be needed in agriculture.

Thus, the role of the secondary schools of agriculture can be expected to grow in importance, and greater priority will need to be given to them by the MAAR. Not only should facilities, equipment and teaching staff be upgraded, but attention should be directed toward a better balance in the overly theoretical curriculum, and added stress given to practical problems involved in working with farmers and farmer organization. At the university level, it appears that attention should be directed to the admittance procedures which result in many students with little or no interest in agriculture getting assigned to agriculture as a lifetime carrier. Also, in view of the growing complexity of modern agriculture, consideration should be given to more specialization in the studies at the undergraduate level.

I. Development of Rural Communities

Expansion of agricultural production and improvement in the status of rural people is an extremely complex process that will require consideration of both natural and human resources and the inter-relationship of the two.

Development will be facilitated if national plans and programs can be made flexible enough to permit differences in local application that reflect the differences between regions in resources and customs. While broad objectives, policies and programs must be established at the national level, implementation must be made at local levels and attainment of goals achieved through local actions. In addition to fitting programs to varying local conditions, the development process is likely to proceed more evenly and quickly if officials administering programs at local levels have the authority and responsibility to adjust their operations within broad policy guidelines to meet unforeseen or changing local conditions. This situation suggests the need for a mechanism that, on the one hand, permits local participation in making decisions on what services are provided and how programs are carried out and, on the other, provides for a feed-back of information from local to national levels that can be used to strengthen the planning process. The following recommendation for a strengthened locally oriented organization is offered as a means of providing such a mechanism.

The Rural Development Centers should be modified and expanded to serve as focal points for the full development of each rural community. The need for strengthening the programs of the Centers has been recognized in previous Five Year Plans and policy statements. The program should be broadened to bring together into one local organization all activities affecting the life of the community. The centers should have the facilities, staff and authority to provide directly or through agencies under their direction the physical inputs and technical information

necessary for improving productivity in each area. The centers should also be able to provide or obtain the health, training and other social services necessary to eliminate the existing inequities between rural and urban areas in access to such services. Finally, they should serve as centers for disseminating information on government policies and programs, organizing local discussions of issues, developing recommendations on adapting national programs to fit local constraints and needs, and for feeding back these recommendations to the national level for incorporation into the planning process.

Adoption of this broadened program will greatly increase and complicate the coordinating function for each Center. Achieving proper coordination has been a serious problem in the past. It will be necessary, therefore, if this proposed change in the function of the Rural Development Centers is to be successful, that increased authority and responsibility be delegated to the management group of each Center. The respective roles of the central ministries and of the local groups will have to be negotiated and the division of authority and responsibility specified. Increased financial support would be required for expanding the programs in existing Centers and for extending the programs to areas not now served. The Centers will have to have funds under their control which can be used in obtaining staff, supplies or services necessary for local development but which central ministries are unable or unwilling to provide. The management function of each Center might be continued as the responsibility of the Ministry of Administration and Local Affairs but operation should be carried out under the direction of local councils. The existing council structure should be modified to include in its membership local representatives of all major cooperating agencies and also a substantial cross-section of local citizens. The manager and his staff should reside in the community where the Center is located. Since the capabilities, needs and character of the community are so heavily influenced by the surrounding agro-ecological conditions, it is suggested that delineations of the area to be served by each Center should be based upon these conditions. The RPU's or some regional grouping of RPU's might be used as a basis for such delineation.

Syria: Agricultural Sector Assessment

Volume 1: Summary Report

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APPENDIX A. APPENDIX TABLES - CHAPTER I

Appendix Table I-1. Gross domestic product at market prices, by sectors, SAR 1963 and 1970-78
(Million SL)

Sectors	1978p	1977	1976	1975	1974	1973	1972	1971	1970	1963
-- Constant 1963 prices --										
Agriculture	2009	1734	1877	1636	1535	1107	1524	1187	1153	1196
Mining and manufacturing	2483	2329	2126	1938	1793	1411	1326	1204	1109	631
Building and construction	438	433	407	269	239	200	204	205	159	119
Transport and communication	877	783	818	1113	880	950	651	797	623	328
Trade	2164	2256	1878	1736	1320	1100	1150	1040	998	758
Finance	331	301	239	193	187	161	157	131	120	81
Real Estate	505	474	443	415	394	381	371	360	347	287
Government	1692	1576	1575	1459	1321	1108	918	814	704	360
Services	932	831	732	636	586	520	486	448	403	220
Total	11431	10717	10095	9395	8255	6938	6787	6186	5616	3980
Agric. % total	17.6	16.2	18.6	17.4	18.5	15.9	22.5	19.2	20.5	30.0
-- Current prices --										
Agriculture	6241	5145	4669	3490	3045	1709	2352	1627	1380	1196
Mining and manufacturing	5243	4877	4835	4440	3758	1942	1729	1450	1264	631
Building and construction	2009	1865	1510	1084	704	395	331	297	225	119
Transport and communication	1351	1308	1216	1383	1003	1045	704)	639	639	328
Trade	6423	6667	5362	4310	3089	1719	1642)	2268	1172	758
Finance	939	854	651	508	186	161	157)	120	120	81
Real Estate	1051	931	797	691	614	578	556)	498	498	287
Government	3635	3028	2936	2510	1606	1198	919)	1806	711	360
Services	2233	1690	1433	1120	865	666	501	424	424	220
Total	29125	26365	23409	19536	14870	9413	8891	7448	6433	3980
Agric. % total	21.4	19.5	19.9	17.9	20.5	18.2	26.5	21.8	21.5	30.0

Source: Central Bureau of Statistics p = Provisional

Appendix Table I-2. Gross fixed capital formation, by sectors, SAR, 1963, 1970 and 1977 (Million SL)

Sector	Constant 1963 prices		Current prices	
	1963	1970	1963	1970
Agriculture	96	210	96	248
Mining & manufacturing	109	152	109	178
Transport & communication	105	135	105	158
Dwellings	131	202	131	298
Other	84	89	84	108
Total	525	788	525	990
		2651		10270

Average annual growth rates
(constant prices - percent):

	1963-70	1970-77
Total	6.0	19.0
Agriculture	11.5	-1.6
Mining & manufacturing	4.3	36.0

Source: Central Bureau of Statistics, in Quarterly Bulletin, Central Bank of Syria, 1978 p = Provisional

Appendix Table I-3. Value of agricultural production, total and per capita, in constant prices, SAR, 1963-77

Year	Total production (Mil.SL)			Per capita production (SL)		
	Plant	Animal	Total	Plant	Animal	Total
1963	984	417	1401	193	82	275
1964	1110	462	1572	211	88	299
1965	1062	442	1504	196	81	277
1966	795	490	1285	142	87	229
1967	1025	445	1470	177	77	254
1968	952	355	1307	159	60	219
1969	1052	573	1625	172	93	265
1970	847	526	1373	134	84	218
1971	994	401	1395	152	62	214
1972	1411	353	1764	209	52	261
1973	919	502	1421	131	72	203
1974	1466	404	1870	202	56	258
1975	1536	478	2014	207	64	271
1976	1779	537	2316	231	70	301
1977	1608	562	2170	201	70	271
<u>Average annual growth rate (percent):</u>						
1963-65 to						
1970-72	0.9	-0.5	0.2	-2.2	-3.7	-3.0
1970-72 to						
1975-77	8.6	4.3	7.5	5.1	0.9	4.0

Source: Statistical Abstracts, 1971-78, Central Bureau of Statistics

Appendix Table I-4. Value of agricultural (food) imports, in current prices, SAR, 1970-77
(Million SL)

Commodities	1970	1971	1972	1973	1974	1975	1976	1977
Fruits and vegetables	60.1	81.3	81.1	102.9	122.8	124.4	196.8	220.8
Live animals								
and meats	22.4	30.3	33.4	44.2	126.7	82.7	27.1	42.4
Sugar, raw and refined	39.9	99.4	113.0	137.3	360.7	427.1	315.2	141.8
Other foodstuffs	236.0	376.7	258.4	284.8	581.3	520.3	559.7	759.9
Total, food	358.4	587.4	485.9	569.2	1,191.5	1,154.5	1,098.8	1,164.9
Total, all imports	1,374.6	1,703.5	2,081.9	2,342.0	4,571.0	6,236.2	9,203.3	10,496.7
Food, % all imports	26.1	34.5	23.3	24.3	26.1	18.5	11.9	11.1

Source: Central Bureau of Statistics and General Directorate of Customs, in Quarterly Bulletin, Central Bank of Syria, 1978.

Appendix Table I-5. Value of agricultural exports in current prices, SAR, 1970-77 (Million SL)

Commodities	1970	1971	1972	1973	1974	1975	1976	1977
Cotton, raw	309.8	313.9	373.1	448.3	715.0	439.4	637.7	836.1
Tobacco	17.6	14.0	20.3	45.2	67.0	81.5	93.2	19.1
Lentils	6.4	19.8	21.3	17.4	10.5	18.3	43.2	71.9
Fruits and vegetables	24.6	27.4	38.9	28.7	38.9	37.1	37.8	47.2
Wool	10.7	18.5	36.5	77.2	57.0	29.7	34.5	49.6
Raw hides and leather	8.8	7.7	17.0	34.0	19.3	23.4	28.5	38.6
Oil-cake	20.8	11.6	29.3	9.9	8.7	4.4	8.8	2.6
Live animals and meats	71.4	25.7	60.5	50.3	12.3	13.1	4.1	5.3
Wheat	-	0.1	84.2	45.0	0.1	-	2.7	2.1
Sub-total, Agriculture	470.1	438.7	681.1	756.0	929.2	646.9	890.5	1,022.9
Crude oil	128.8	176.0	200.2	291.2	1,607.5	2,376.9	2,585.7	2,435.7
Other	176.4	174.2	259.4	294.1	377.3	417.1	665.1	740.4
Total	775.3	788.9	1,140.7	4,341.3	2,914.0	3,440.9	4,141.3	4,199.0
Agric. % Total	60.6	55.6	59.7	56.4	31.9	18.8	21.5	24.4
Agric. % Total less crude oil	72.7	71.6	72.4	72.0	71.1	60.8	57.2	58.0
Cotton % Agric.	65.9	71.6	54.8	59.3	76.9	67.9	71.6	81.7
Cotton % Total	40.0	39.8	32.7	33.4	24.5	12.8	15.4	19.9

Source: Central Bureau of Statistics and General Directorate of Customs, in Quarterly Bulletin, Central Bank of Syria, 1978.

Appendix Table I-6. National Development Goals, Third Five-Year Plan,
1971-1975, Syrian Arab Republic 1/

General Goals

1. Strengthen social and economic development through full use of all productive resources.
 2. Strengthen overall Arab unity by developing economic integration and coordination.
 3. Achieve a social and economic revolution within the country to guarantee all citizens freedom, dignity, equal opportunities and justice in distribution of income, to abolish monopolistic exploitation and build a unified Arab socialist society.
 4. Establish a developed industrial-agricultural economy as a strong basis for permanent self-development, and for achieving an average annual growth rate of 8,2 percent in GDP.
 5. Increase and diversify crop and livestock production through optimal use of irrigation, modern agricultural techniques, mechanization, fertilizer and improved seeds, as well as through training of the labor force and establishing cooperatives.
 6. Move steadily toward completion of the Euphrates Dam and the development of lands to be irrigated by it.
 7. Build the industrial base through modernization of existing industries and by establishing others to exploit natural and agricultural resources.
 8. Utilize the geographic location of the country by developing international communications and trade.
 9. Utilize modern technology to achieve production potentials and overcome unemployment.
 10. Stress improved rural living conditions and productive capacity, especially in remote areas, by providing essential public services, establishing rural industries and limiting migration to urban areas.
 11. Direct manufacturing toward diversified and increased exports, as well as toward import substitution.
 12. Improve domestic commerce through public sector domination on wholesale trade, increased role for cooperative trade and use of the pricing system.
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Continued

Appendix Table I-6. (Continued)

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13. Raise the level of educational, health, cultural, social and housing services, improve management methods, and provide social security for all the people.
 14. Support popular organizations and create incentives to develop the social and economic structure.
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1/ Third Five-Year Economic and Social Develop Plan of the Syrian Arab Republic, 1971-1975, Annex 1 (Abridged)

Appendix Table I-7. Agricultural Sector Goals, Third Five-Year Plan,
1971-1975, Syrian Arab Republic 1/

A. Euphrates Sector

1. Establish electric power capacity of 300,00 kw.
2. Complete the Euphrates Dam by the end of 1975.
3. Complete the 17,600 ha. project for agricultural research.
4. Reclaim and irrigate 38,700 ha., employing an additional 53,000 workers during the Plan period.

B. Irrigation Sector

1. Determine the volume and availability of underground water and its relation to surface water.
2. Improve the stream beds of the Barada, Al Awaj, Jaghjagh and Khabour Rivers.
3. Improve methods of irrigation and drainage.
4. Provide the wells needed in the desert for watering sheep.
5. Increase the area of irrigated land from 495,000 ha. to 550,000 ha.
6. Complete irrigation projects already under construction.
7. Drain marshlands and build small and medium dams.

C. Agricultural Sector

1. Concentrate on those crops and livestock that are major foods, provide raw materials to industry, substitute for imports, or utilize relatively large land areas.
 2. Raise productivity of labor through training and supervision, use of machinery and improved inputs.
 3. Reduce seasonal unemployment by increasing the agricultural labor force from 1,170,000 to 1,340,000 during the Plan period.
 4. Increases the productivity of land with the total area remaining at 6,100,000 ha.
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Continued

Appendix Table I-7. (Continued)

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5. Increase agricultural production and service cooperatives from 1,600 to 4,500 during the Plan period.
 6. Establish at least two State farms in each Mohafazat.
 7. Use material and organizational incentives as a basic means of achieving Plan goals.
 8. Develop scientific agricultural research, and increase the number of agricultural technicians.
 9. Expand the volume of agricultural credit, giving priority to the co-operatives and public sectors, to medium and long term loans, and to credit in kind.
 10. Increase the use of agricultural machinery by establishing a tractor factory in Aleppo, and by setting up maintenance stations.
 11. Improve the storage of cereals by establishing 11 grain elevators, 3 seed distribution centers, and a concentrated feed plant.
 12. Expand the production and processing of oil seed crops.
 13. Improve methods in apiculture and sericulture.
 14. Introduce fodder crops into the agriculture course.
 15. Develop cattle productivity through cross-breeding.
 16. Provide needed veterinary care and artificial insemination services.
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1/ Third Five-Year Economic and Social Development Plan of the Syrian Arab Republic, 1971-1975, Annex 1-B (Abridged)

Appendix Table I-8. Agricultural Sector Goals, Sixth, Fifth, and Fourth Regional Conferences of the Ba'ath Party, Syrian Arab Republic

Sixth Regional Conference, 1975 1/

1. Provide the country's requirements for most agricultural commodities.
2. Provide industrial projects' requirements for agricultural materials.
3. Increase agricultural production (crop and livestock) and the size of agriculturally-based industries, and provide export capabilities for balancing our trade balance.
4. Increase irrigated and cultivated area of agricultural lands, and increase their productivity.
5. Distribute agricultural peasants' cooperatives in all the rural regions, complete the organization of workers in the agricultural sector, provide the incentives needed to encourage cooperative production and fruit tree planting, and protect forests and increase their area.

Fifth Regional Conference, 1971 2/

1. Liquidate the feudal system and all the relations that are relevant to, or caused by it.
2. Establish more socialist cooperatives, support them and enable them to cover all the State, Agrarian Reform and confiscated properties.
3. Improve production practices and expand the area of irrigated land.
4. Increase the rate of agricultural production and encourage rural industries.
5. Improve the conditions of the forest and ranges.
6. Improve training, etc. of the administrative and technical personnel in the Ministry of Agriculture and Agrarian Reform.

Fourth Regional Conference, 1968 1/

1. Prevent the distribution of Agrarian Reform lands and State and Wakf properties to the peasants.
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Continued

Appendix Table I-8. (Continued)

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2. Set a central plan for the increase, improvement and diversification of the production.
 3. Firmly establish, and improve, the principles of cooperative action.
 4. Firmly establish, and improve, the technical, administrative and productive status of the State farms so that they will be able to lead the agricultural sector along with the cooperatives.
 5. Expand the area of irrigated land and determine the basis which is to be considered in the implementation of State irrigation projects.
 6. Expand the use of machinery and other scientific implements in the field of agricultural production; also provide the necessary production inputs.
 7. Develop the Agricultural Cooperative Bank so that it will be able to operate in accordance with the Socialist transformation.
 8. Develop plans for the agricultural sector on all relevant levels (pricing, marketing, processing).
 9. Form a committee to supervise all activities performed within the framework of the agricultural sector and which will be capable of following up on the implementation of the Party's agricultural policy.
 10. Decrease the amount of lands owned.
 11. Prevent joint possession of lands.
 12. Make the specialization allowance provided for agricultural technicians contingent upon the quality and amount of field work and production.
 13. Consider the issue of inheritance, and develop and apply the relevant theoretical data.
 14. Provide the necessary socialist personnel for supervising the development of cooperatives.
 15. Resolve the issue of communally owned land.
 16. Increase the number of sections in the school for agricultural assistants, and open schools in all the highly productive Mohafazats in order to meet the country's requirements for these assistants.
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Continued

Appendix Table I-8. (Continued)

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17. Open evening schools for the workers and peasants so that they will be sufficiently equipped to run the cooperatives and the cooperative farms.
 18. Determine the number of Rural Rehabilitation Centers and finance them for practical realization of the Party's and the Revolution's interests.
 19. Study the situation of the villages that are located in low rainfall areas.
 20. Expand employment of willing agricultural engineers and those who have obtained their agricultural secondary school certificates in agricultural enterprises; State projects and the different cooperatives.
 21. Issue a modified decree for agricultural relations that will help in arriving at a better Socialist transformation.
 22. Set up a system of penalties for those officials who have not fully carried out their assignments of ending distribution of Agrarian Reform lands, as well as those responsible for the failure of cooperative marketing activities.
 23. Modify the irrigation fee law concerned with State projects so that the aims of their implementation will be realized.
 24. Stress the particular importance of agricultural processing; and of livestock, devoting special attention to these production practices, and opening grazing lands and the feed factories needed for this purpose.
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1/ Economic Recommendations Adopted by the Sixth Regional Conference of the Ba'ath Party, April 1975, Damascus, Syrian Arab Republic

2/ Resolutions and Recommendations of the Party's Regional and National Conferences in the Field of Economy and the General Objectives of the Economic Plans, Economic Bureau, Al Ba'ath Socialist Arab Party, Syrian Arab Republic, Regional Command, 1975

Appendix Table I-9. Fourth Five-Year Plan, SAR: Investment program for ongoing, new and reserve projects (Million SL)

Sector	Type of Project				Percent of total
	Ongoing	New	Reserve	Total	
Euphrates	7,379	60	-	7,439	14
Irrigation & Land Reclamation	456	639	310	1,405	3
Agriculture	1,226	678	178	2,082	4
Sub-total	9,061	1,377	488	10,926	21
Mining & Industry	7,403	2,487	2,200	12,090	23
Energy & Fuels	4,277	3,708	989	8,974	17
Transport & Communications	3,481	1,655	1,555	6,691	13
Trade	214	730	281	1,225	2
Housing & Utilities	983	3,014	371	4,368	8
Services	1,755	3,440	2,245	7,440	14
Municipalities	-	1,034	-	1,034	2
Popular Work	-	159	-	159	-
Total	27,174	17,604	8,129	52,907	100
<u>Percent of total:</u>					
Euph/Irrig/Agric.	83	13	4	100	-
All sectors	51	33	15	100	-

Source: Fourth Five-Year Economic and Social Development Plan of the Syrian Arab Republic, 1976-1980. Annex 3.

Appendix Table I-10. Financial implementation of The Fourth Five-Year Plan, by Sector, SAR (Million SL)

Sector	Fourth Plan 1976-1980	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
Euphrates Dam & Basin	7,439	606	443	641	393	780	511	875
Irrigation & Land Reclamation	1,405	97	48	116	61	173	88	298
Agriculture	2,082	442	215	263	125	260	130	416
Agric. Sector Sub-total	10,926	1,145	706	1,020	579	1,213	729	1,589
Industry & Mining	12,926	3,108	1,797	2,875	2,081	2,786	2,200	1,974
Energy & Fuels	8,974	1,743	1,181	2,074	1,422	1,846	1,363	1,049
Transport & Communications	6,691	1,302	741	1,110	707	1,349	785	1,577
Trade-Domestic & Foreign	1,225	230	126	152	100	188	89	302
Housing & Utilities	4,368	355	188	590	378	537	302	533
Services	7,440	1,205	688	1,345	731	747	351	701
Municipalities	1,034	190	148	194	143	243	156	452
Popular Work	159	45	30	46	27	201	106	401
Other Sector Sub-total	41,981	8,178	4,899	8,386	5,589	7,897	5,352	6,989
Total	52,907	9,323	5,605	9,406	6,168	9,110	6,081	8,578

Source: Fourth Five-Year Economic and Social Development Plan of The Syrian Arab Republic, 1976-1978,
and the State Planning Commission

Appendix Table I-11. Financial implementation of agricultural sector projects, Fourth Five-Year Plan, SAR (Million SL)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
Ministry of the Euphrates								
General Establishment-Euphrates								
Dam								
a. Ongoing Projects								
1. Euphrates Dam	207.0	116.0	95.1	123.5	104.3	65.8	35.5	21.2
2. Land reclamation-Meskeneh	1,390.0	105.0	80.9	160.5	143.7	234.2	200.2	296.5
Sub-total	1,597.0	221.0	182.0	284.0	248.0	300.0	235.7	317.7
b. New Projects								
3. Regulation dam	60.0	-	-	-	-	-	-	6.5
c. Reserve Projects	-	-	-	-	-	-	-	-
Total	1,657.0	221.0	182.0	284.0	248.0	300.0	235.7	324.2
General Establishment-Euphrates								
Basin								
a. Ongoing Projects								
4. Euphrates Basin	5,782.0	384.9	260.7	357.0	145.3	480.1	275.1	551.0
b. New Projects	-	-	-	-	-	-	-	-
c. Reserve Projects	-	-	-	-	-	-	-	-
Total	5,782.0	384.9	260.7	357.0	145.3	480.1	275.1	551.0
Total-Euphrates	7,439.0	605.9	442.7	641.0	393.3	780.1	510.8	875.2

(Continued)

Appendix Table I-11. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
<u>Ministry of Public Works/Water Resources</u>								
<u>a. Ongoing Projects</u>								
1. Machinery for irrigation maintenance	8.5	8.5	6.7	1.8	1.7	.1	-	1.6
2. Digging/equipping desert wells	6.5	5.5	.4	3.6	1.6	4.2	1.2	2.5
3. Settlement of former obligations	1.5	.5	.2	.3	.1	.3	.1	.3
4. Vocational training centers (2)	9.0	6.0	2.7	2.6	1.0	1/	1/	1/
Sub-total	25.5	20.5	10.0	8.3	4.4	4.6	1.3	4.4
<u>b. New Projects</u>								
5. Construction of dams/irrigation networks	314.9	15.9	7.0	18.4	4.7	45.4	11.7	114.5
6. Survey/study Ghouta/A'waj irrigation	5.0	1.7	"	.9	"	.8	-	.8
7. Study/execution Upper Yarmouk irrigation	30.0	1.7	-	.9	-	.9	-	2.4
8. Study/execution Nassrieh irrigation	20.0	1.7	-	.9	-	-	-	2.4
9. Study public water pollution	2.5	.9	"	1.3	.9	.9	.2	.7
10. Use of sprinkler irrig.	15.0	.5	-	-	-	-	-	-
11. Vocational training centers (4)	20.0	-	-	-	-	-	-	-
Sub-total	407.4	22.4	7.1	22.4	5.7	48.0	11.9	120.8

(Continued)

Appendix Table I-11. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	
c. <u>Reserve Projects</u> Total	432.9	42.9	17.1	30.7	10.1	52.6	13.2	125.2
General Establishment-Major Projects								
a. <u>Ongoing Projects</u>								
1. Development of The Ghab	120.0	12.0	10.0	13.3	9.6	12.1	12.1	30.3
2. Completion of water basin study	107.0	17.9	11.1	24.4	19.1	26.7	19.9	26.1
3. Development of the Range	16.0	4.4	3.6	3.0	1.6	8.4	1.4	6.7
4. Construction of irrig. on Tell Do dam	14.0	2.1	.1	3.6	3.2	3.1	.3	4.1
5. Study/execution of dam on North Nahr el Kabir	150.0	5.7	2.3	21.4	8.9	31.0	23.3	62.2
6. Common admin. expenses	16.0	3.2	2.7	4.1	3.2	3.6	3.4	4.5
Sub-total	423.0	45.3	29.8	69.8	45.6	84.9	60.4	133.9
b. <u>New Projects</u>								
7. Study of Afrine/Abrash/Arous dams	10.0	1.5	.3	.9	.1	1.5	.9	1.0
8. Study of Hama/Sarout dams	10.0	1.5	-	1.1	.5	1.5	.1	3.5
9. Irrig. of Kabour basin	100.0	3.5	.4	4.1	.2	16.0	10.7	7.7
10. Irrig. of Tigris (Dajleh) basin	40.0	1.2	.9	1.2	.3	2.3	.7	4.9
11. Sprinkler irrig. on the Senn	10.0	.6	.1	.8	.3	.8	.2	.2
12. Barada River improvement	50.0	.7	"	.3	"	9.4	"	2.1
- Winter irrig. on Jaghjeh and Kabour	-	-	-	7.0	4.0	4.0	1.6	6.8
- Irrig./drainage for Ghab/Senn basins	-	-	-	-	-	-	-	4.0
- Flood control in Tartous	-	-	-	-	-	-	-	8.1
Sub-total	220.0	9.0	1.7	15.4	5.4	35.5	14.2	38.3

(Continued)

Appendix Table I-11. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
c. Reserve Projects								
13. Erection of Afrine/Abrash/Arous dams	140.0	-	-	-	-	-	-	-
14. Erection of Hama/Sarout dams	140.0	-	-	-	-	-	-	-
15. Exploitation of water basins	30.0	-	-	-	-	-	-	-
Sub-total	310.0	-	-	-	-	-	-	-
Total	953.0	54.3	31.5	85.2	51.0	120.4	74.6	172.2
Total- Irrigation	1,385.9	97.2	48.6	115.9	61.0	173.0	87.8	297.4
Total-Euphrates/Irrigation	8,824.9	703.1	491.3	756.9	454.4	953.1	598.6	1,172.6
Ministry of Agriculture/Agrarian Reform								
a. Ongoing Projects								
1. Completion of potato stores	36.0	19.0	2.0	-	-	7.0	"	-
2. Strengthening pest fighting	20.4	3.2	1.3	5.7	.8	4.9	3.5	18.8
3. Production of fruit tree saplings	35.0	6.2	3.1	11.9	3.4	9.0	6.5	11.3
4. Development ag. research stations	5.0	3.5	1.6	2.2	.7	1.5	1.2	16.2
5. Multiplication of potato seeds	8.3	4.7	1.9	5.9	.8	2.4	1.9	1.2
6. Renewing/equipping desert wells	15.0	4.3	1.3	5.9	3.3	3.1	4.9	4.9
7. Surveying/classification of land	16.1	2.6	1.2	5.3	.7	1.4	.8	1.0
8. Settlement of livestock breeding	8.4	-	-	-	-	-	-	-
9. Completion of grain silos/centers 7/	260.0	62.0	56.0	48.1	42.3	44.0	43.1	33.9
Sub-total	404.2	105.5	68.4	85.0	52.0	73.3	61.9	87.3

(Continued)

Appendix Table I-11. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	
b. New Projects								
9. Development of vet. care/ artificial insemin.	111.0	9.0	3.5	13.9	5.3	17.1	10.2	28.4
10. Agric. machinery stations	50.0	6.5	"	-	-	1.8	.5	16.0
11. Integrated agri. project	9.2	.7	.5	1.1	.8	1.3	1.2	1.9
- Nurseries and forest control	-	-	-	7.1	4.3	8.5	7.8	18.6
- Repaying previous loans	-	-	-	1.3	.7	-	-	-
- Improvement of sheep	-	-	-	-	-	-	-	40.0
- Beehives in Kourdaba	-	-	-	-	-	-	-	.1
- Arabic Center for Dryland/ Arid Areas	-	-	-	-	-	-	-	.5
- Improvement in agric. extension	-	-	-	-	-	-	-	1.8
Sub-total	170.2	16.2	4.0	23.4	11.1	28.7	19.7	107.3
c. Reserve Projects								
Total - MAAR	574.4	121.7	72.4	108.4	63.1	102.0	81.6	194.6
Directorate of Real Estate								
a. Ongoing Projects								
1. Cadastral/removal of joint possession	85.0	6.7	4.7	9.9	5.5	13.1	10.5	6.5
b. New Projects								
c. Reserve Projects								
Total	85.0	6.7	4.7	9.9	5.5	13.1	10.5	6.5
Total - MAAR + Real Est.	659.4	128.4	77.1	118.3	68.6	115.1	92.1	201.1

(Continued)

Appendix Table I-11. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
General Organization-Poultry								
a. Ongoing Projects								
1. Complete poultry stations (Hama/Aleppo/Lattakia)	62.0	35.2	28.9	26.5	15.7	20.5	7.3	19.5
2. Complete egg laying compound (Maarra)	13.0	7.0	3.6	5.8	1.6	5.5	1.8	4.3
3. Complete egg laying compound (Sweida)	16.0	13.0	11.5	5.3	1.4	5.3	1.7	5.0
4. Complete poultry station (Hama)	10.0	6.0	5.7	4.4	1.8	3.9	.8	2.1
5. Complete poultry station (Tartous)	5.2	3.2	1.4	4.0	.7	3.6	.6	2.7
6. Complete/develop Seydnaya installation	42.0	15.5	8.1	12.9	7.5	10.8	8.0	9.3
7. General Organization-Poultry	16.0	2.0	.8	1.3	.7	.9	.8	1.4
Sub-total	164.2	81.9	60.0	60.2	29.4	50.5	21.0	44.3
b. New Projects								
8. Poultry complexes (Deir Ezzor/Aleppo/Ezraa)	350.0	15.8	-	-	-	-	-	-
9. Egg laying station (Hassiel)	35.0	20.0	-	-	-	-	-	-
- Egg laying station (Kourdaba)	-	-	-	-	-	2.0	-	3.8
- Hatchery (Damascus)	-	-	-	-	-	1.0	-	3.7
- Hatchery (Hassieh)	-	-	-	-	-	1.0	-	3.7
- Hatchery (Aleppo)	-	-	-	-	-	1.0	-	3.7
- Hatchery (Hassieh)	-	-	-	-	-	1.0	-	3.7
Sub-total	385.0	35.8	-	-	-	6.0	-	18.6

(Continued)

Appendix Table I-11. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	
c. <u>Reserve Projects</u>	-	-	-	-	-	-	-	-
Total-Poultry G.O.	549.2	117.7	60.0	60.2	29.4	56.5	21.0	62.9
General Organization-Fisheries								
a. <u>Ongoing Projects</u>								
1. Complete fish farms	10.6	12.9	10.1	10.4	4.0	4.6	3.9	9.3
2. Complete El Assad Lake	2.0	1.0	.6	.8	.4	.4	.3	.7
3. Development of sea-fishing nucleus	7.0	2.6	.7	7.4	3.8	"	"	-
4. Exploitation of natural water pools	4.8	.9	.2	-	-	-	-	-
Sub-total	24.4	17.4	11.6	18.6	8.2	5.0	4.2	10.0
b. <u>New Projects</u>								
5. Fish breeding farm (Rakka)	12.0	.5	.2	1.5	-	-	-	-
6. General Organization-Fisheries	5.2	1.7	1.6	1.0	.9	1.0	.8	1.1
Sub-total	17.2	2.2	1.8	2.5	.9	1.0	.8	1.1
c. <u>Reserve Projects</u>								
7. Fish farm (Hawash)	8.0	-	-	-	-	-	-	-
8. Fish farm (Tartous)	3.0	-	-	-	-	-	-	-
9. Fish farm (Rakka)	5.0	-	-	-	-	-	-	-
10. Fish hatchery (Homs)	2.0	-	-	-	-	-	-	-
Sub-total	18.0	-	-	-	-	-	-	-
Total-Fisheries G.O.	59.6	19.6	13.4	21.1	9.1	6.0	5.0	11.1

(Continued)

Appendix Table I-11. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	
<u>General Organization-Fodder</u>								
a. <u>Ongoing Projects</u>								
1. Complete forage stores	18.0	7.3	7.3	20.4	10.4	3.0	2.2	19.5
b. <u>New Projects</u>								
2. Create forage reserve	50.0	50.0	50.0	-	-	-	-	-
3. Green forage processing plant	10.0	3.0	.3	2.6	-	-	-	-
4. General Organization-Forage	25.0	3.0	1.4	5.0	4.0	3.1	2.9	4.3
Sub-total	85.0	56.0	51.7	7.6	4.0	3.1	2.9	4.3
c. <u>Reserve Projects</u>	-	-	-	-	-	-	-	-
Total-forage G.O.	103.0	63.3	59.0	28.0	14.4	6.1	5.1	23.8
<u>General Organization-Cattle</u>								
a. <u>Ongoing Projects</u>								
1. Complete 13 cattle stations	113.0	85.0	3.1	10.0	2.0	25.2	2.5	39.4
2. Erect 14 cattle stations	211.0	25.0	"	-	-	45.9	.2	51.1
Sub-total	324.0	110.0	3.1	10.0	2.0	71.1	2.7	90.5
b. <u>New Projects</u>								
3. General Organization-Cattle	15.0	3.0	2.5	2.5	1.1	1.4	.9	1.4
- Dairy station (Der Bealbe)	-	-	-	-	-	4.0	3.1	8.9
- Improved existing dairy stations	-	-	-	-	-	-	-	16.7
Sub-total	15.0	3.0	2.5	2.5	1.1	5.4	4.0	27.0

(Continued)

Appendix Table I-11. (Cont'd)

Authority and Project	Fourth Plan 1976-1980	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
c. <u>Reserve Projects</u>								
4. Erect 10 cattle stations	160.0	-	-	23.2	.1	-	-	-
Total-Cattle G.O.	499.0	113.0	5.6	35.7	3.2	76.5	6.7	117.5
Total - MAAR + G.O.s	1,870.2	442.0	215.1	263.3	124.7	260.2	129.9	416.4
Total - Agricultural Sector	10,695.1	1,145.1	706.4	1,020.2	579.1	1,213.3	728.5	1,589.0

Source: Fourth Five-Year Economic and Social Development Plan of the Syrian Arab Republic, 1976-1980, Annex 3, and The State Planning Commission.

- = zero; ... = Less than SL 50,000.

1/ Transferred to Local Administration

2/ Construction being carried out by the General Establishment for Major Projects.

Appendix Table I-12. Financial implementation of projects related to the agricultural sector, Fourth Five-Year Plan, SAR (Million SL)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
<u>General Organization-Food Industries</u>								
(Food processing factories)								
a. Ongoing Projects	133.9	38.0	24.1		50.8	24.4	19.2	42.0
b. New Projects	29.6	13.2	.5		2.7	7.7	6.9	5.1
c. Reserve Projects	135.0	-	-	-	-	-	-	2.6
Total	298.5	51.2	24.6	64.8	53.5	32.1	26.1	49.7
<u>General Organization-Chemical Industries</u>								
a. Ongoing Projects	22.9	13.0	10.1	9.7	11.6	-	-	-
2. Tannery (Damascus)	52.0	11.7	12.4	22.3	21.4	6.7	6.7	11.0
3. Tannery (Aleppo)	741.7	164.0	114.7	272.7	289.6	292.1	280.5	152.3
7. Triple superphosphate (Homs)	737.5	137.0	141.9	216.8	128.8	294.3	353.4	143.8
8. Amonia-urea (Homs)								
Sub-total	1,554.1	325.7	279.1	521.5	451.4	593.1	640.6	307.1
b. New Projects								
18. Triple superphosphate (Deir Ezzor)	450.0	114.4	...	-	-	-	-	-
19. Tannery (Damascus)	43.0	1.0	-	-	-	-	-	-
Sub-total	493.0	115.4	...					
c. Reserve Projects	-	-	-	-	-	-	-	-
Total	2,047.1	441.1	279.1	521.5	451.4	593.1	640.6	307.1
<u>General Organization-Textile Industries</u>								
a. Ongoing Projects	1,142.5	393.8	382.3	418.5	355.2	276.0	187.0	157.8
b. New Projects	85.5	6.2	-	.5	...	-	-	-
c. Reserve Projects	239.0	-	-	-	-	-	-	-
Total	1,467.0	400.0	382.3	419.0	355.2	276.0	187.0	157.8

(Continued)

Appendix Table I-12. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
<u>General Sugar Organization</u> a. <u>Ongoing Projects</u> (Sugar factories at Rakka/Meskane/ South Ghab/Deir Ezzor) b. <u>New Projects</u> c. <u>Reserve Projects</u> Total	616.1	264.6	234.9	318.0	259.7	212.2	200.6	193.0
	1.3	.1	-	-	-	-	-	-
	15.2	5.0	...	-	-	-	-	-
	632.6	269.7	234.9	318.0	259.7	212.2	200.6	193.0
<u>Euphrates Tractor Company</u> a. <u>Ongoing Projects</u> b. <u>New Projects</u> c. <u>Reserve Projects</u> Total	150.0	-	-	32.0	33.4	41.2	49.3	33.3
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	150.0	-	-	32.0	33.4	41.2	49.3	33.3
<u>General Company-Phosphate and Mines</u> a. <u>Ongoing Projects</u> b. <u>New Projects</u> c. <u>Reserve Projects</u> Total	152.4	79.8	39.5	64.6	11.2	59.0	37.5	45.4
	183.7	5.3	.8	-	-	-	-	15.6
	48.5	-	-	-	-	-	-	-
	384.6	85.1	40.3	64.6	11.2	59.0	37.5	61.0
<u>Ministry of Supply/Home Trade</u> <u>Central Administration</u> a. <u>Ongoing Projects</u> 1-2. <u>Refrigeration units</u> b. <u>New Projects</u> 3-6. <u>Refrigeration units</u> 12-13. <u>Automatic bakeries</u> Sub-total	23.2	13.5	12.2	17.3	11.2	2.9	2.3	3.1
	41.0	.4	-	.4	.1	2.0	.7	3.6
	184.8	-	-	31.5	...	45.1	36.5	25.0
	225.8	.4	-	31.9	.1	47.1	37.2	28.6

(Continued)

Appendix Table I-12. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	
c. Reserve Projects								
14-18. Refrigeration units	67.6	-	-	-	-	-	-	75.0
24. Automatic bakeries	80.2	-	-	-	-	-	-	-
Sub-total	147.8	-	-	-	-	-	-	75.0
Total	396.8	13.9	12.2	49.2	11.3	50.0	39.5	106.7
General Organization-Cereal								
Trade and Proc. (Mills, storage, dryers)								
a. Ongoing Projects	356.8	58.8	44.3	90.0	75.0	68.8	67.7	183.6
b. New Projects	15.5	2.1	...	1.0	1.0	1.5	1.5	1.0
c. Reserve Projects	75.2	-	-	-	-	-	-	-
Total	447.5	60.9	44.3	91.0	76.0	70.3	69.2	184.6
General Organization-Tobacco								
a. Ongoing Projects	50.5	32.5	22.8	18.0	3.8	13.0	.1	13.0
b. New Projects	85.5	2.5	2.0	.6	.6	6.1	4.8	24.8
c. Reserve Projects	15.0	-	-	-	-	-	-	-
Total	151.0	35.0	24.8	18.6	4.4	19.1	4.9	37.8
General Cotton Organization								
a. Ongoing Projects	65.0	23.1	21.2	20.0	12.7	17.2	51.8	25.9
b. New Projects	-	-	-	-	-	-	-	-
c. Reserve Projects	-	-	-	-	-	-	-	-
Total	65.0	23.1	21.2	20.0	12.7	17.2	51.8	25.9

(Continued)

Appendix Table I-12. (Cont'd)

Authority and Project	Fourth Plan	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
Agricultural Cooperative Bank								
a. Ongoing Projects	30.0	8.1	7.9	-	-	-	-	-
b. New Projects	5.0	.9	.5	-	-	-	-	-
c. Reserve Projects	-	-	-	-	-	-	-	-
Total	35.0	9.0	8.4	-	-	-	-	-
Total-Org. Affecting Agri.	6,075.1	1,389.0	1,072.1	1,598.7	1,268.8	1,370.2	1,306.5	1,156.9

Source: Fourth Five-Year Economic and Social Development Plan of The Syrian Arab Republic, 1976-1980, Annex 3, and The State Planning Commission

- = zero; ... = Less than SL 50,000.

Appendix Table I-13. Financial implementation of The Fourth Five-Year Plan, by local administration authorities, SAR, 1976-79 (Million SL)

Sub-sectors	Fourth Plan 1976-1980	1976		1977		1978		1979
		Alloc.	Expen.	Alloc.	Expen.	Alloc.	Expen.	Alloc.
Agriculture 1/	176.7	22.9	7.1	37.0	24.2	26.8	18.4	50.6
Consumer Establishment 2/	81.0	9.9	1.9	23.8	15.4	19.5	9.5	19.9
Education 3/	2,456.0	349.0	313.0	291.9	212.0	252.1	224.7	351.6
Culture 4/	142.6	6.9	3.4	11.9	4.1	7.8	4.9	10.5
Social Affairs & Labor 5/	104.6	26.5	10.4	13.7	8.4	7.8	3.5	13.6
Health 6/	680.6	56.5	17.9	54.3	17.3	38.9	21.2	47.3
Housing & Public Utilities 7/	890.4	102.6	62.3	157.7	74.6	134.6	72.6	188.7
Public Works 8/	79.6	34.5	23.3	34.6	22.4	23.3	14.3	23.3
Ministry of Communications 9/	176.6	50.8	83.8	70.9	44.4	88.2	68.0	179.4
Municipalities 10/	1,034.2	188.6	147.1	193.9	143.5	243.4	156.2	451.7
Popular Work 11/	159.7	44.3	30.1	43.5	26.9	200.7	105.9	401.5
Total	5,982.0	892.5	700.3	933.2	593.2	1,043.1	699.2	1,738.1

Source: Fourth Five-Year Economic and Social Development Plan of The Syrian Arab Republic, 1976-1980, Annex 3, and The State Planning Commission.

1/ Chiefly fruit tree planting, reforestation and completion of agricultural schools

2/ Sales rooms

3/ Primary, secondary, vocational and normal schools

4/ Cultural centers and mobile units

5/ Guidance units and rural development centers

6/ Hospitals, health centers, nursing schools

7/ Chiefly water supply projects

8/ Government buildings, irrigation and drainage

9/ Roads

10/ Municipal structures, roads, sewers, fire fighting, etc.

11/ Citizen participation projects

Appendix Table I-14. Targeted and actual levels of agricultural production, Fourth Five-Year Plan, SAR 1975-1980 (000 tons)

Commodities	Base Year 1975	Actual			Pro- jected 1980	Target year 1980
		1976	1977	1978		
Cereals	2,222	2,916	1,636	2,453	2,704	3,388
Food legumes	140	214	168	139	215	435
Oil crops	34	55	50	48	73	157
Sugar beets	198	242	273	252	600	2,000
Cotton	392	409	395	377	388	404
Potatoes	144	132	164	199	332	395
Tomatoes	363	517	454	502	475	475
Onions	117	100	161	160	174	189
Fodder legumes	44	65	60	52	79	151
Green forage	371	402	382	444	800	7,911
Fruits	675	842	830	898	1,315	1,133
Meat and fish	93	124	136	154	171	194
Milk	567	705	770	844	929	960
Eggs (Million)	600	699	707	731	1,200	1,500

Source: Base and target year data from The Fourth Five-Year Economic and Social Development Plan of The Syrian Arab Republic, 1976-1980, Annex 2; actual and projected data from The State Planning Commission.

Appendix Table I-15. Targeted and projected production of livestock products, Fourth Five-Year Plan, SAR, 1975-1980

Commodities 1/	Base Year 1975			Projected 1980			Target Year 1980		
	Public	Private	Total	Public	Private	Total	Public	Private	Total
Meat - Total	1.4	91.6	93.0	8.0	163.0	171.0	33.1	160.9	194.0
Sheep/goats	-	60.0	60.0	0.3	99.7	100.0	-	80.0	80.0
Beef	0.3	14.7	15.0	1.1	25.9	27.0	3.3	26.7	30.0
Chicken	0.8	14.2	15.0	3.6	36.4	40.0	20.8	49.2	70.0
Fish	0.3	2.7	3.0	3.0	1.0	4.0	9.0	5.0	14.0
Milk - Total	8.0	559.0	567.0	13.0	916.0	929.0	71.0	889.0	960.0
Sheep/goats	-	312.0	312.0	1.0	528.0	529.0	-	455.0	455.0
Cow	8.0	247.0	255.0	12.0	388.0	400.0	71.0	434.0	505.0
Eggs - Total	2.0	598.0	600.0	166.0	1,034.0	1,200.0	377.0	1,163.0	1,500.0

Source: Base and target year data from The Fourth Five-Year Economic and Social Development Plan of The Syrian Arab Republic, 1976-1980, Annex 2, projected data for 1980 from The State Planning Commission.

1/ Meat and milk in 000 tons; eggs in millions

Appendix Table I-16. Achievements toward intermediate agricultural targets,
Fourth Five-Year Plan, SAR, 1976-1980

Intermediate targets	Achievement during:				Projected 1980	Target 1980
	1976	1977	1978	1976- 1978		
<u>Land and Water</u> (000 ha)						
- Area prepared for irrigation (Euphrates Basin)	2.8	-	4.6	7.4	43.2	240.0
- Area for cultivation (Euphrates Basin)	1.5	1.3	4.6	7.4	33.0	135.0
- Areas irrigated for cultivation (other regions)	2.9	.3	1.8	5.0	10.0	53.0
- Soil classification	211	143	115	469	704	1,196
- Land registration	28	25	21	74	104	181
- Land improvement	1.5	2.2	-	3.7	3.7	11.0
- Land surveying	196	262	131	589	849	868
- Tree planting: non-irrig. areas	-	-	84	84	129	90
- Tree planting: irrigated areas	-	-	8	8	25	20
<u>Dams</u> (number)						
- Medium sized dams (capacity 1,100 mil.m ³)	-	-	-	-	-	7
- Small dams (capacity 177 mil.m ³)	3 (35.6)	1 (19.5)	3 (17.6)	7 (72.7)	20 (126.5)	41 (177.0)
- Diversion dams	-	-	-	-	-	10
- Irrig./drainage networks for old and new dams	1	-	1	2	8	47
- Studies on supply/use of surface/ground water	-	-	C o m p l e t e d			
<u>Services</u> (number)						
- Agric. machinery service station	-	-	-	-	3	5
- Mobile workshops	-	-	-	-	50	125
- Development desert wells	14	26	31	17	111	100
- Silos for cereal storage (810,000 t.)	-	-	-	-	14	14
- Storages for production inputs (46,000 m ²)	-	-	10	10	20	31
- Storages for potatoes (33,000 t.)	-	-	-	-	-	11
- Storages for forage (261,000 t.)	-	-	-	-	141	141

Continued

Appendix Table I-16. (Cont'd)

Intermediate targets	Achievement during:				Projected 1980	Target 1980
	1976	1977	1978	1976- 1978		
<u>Plant Production</u>						
- Fruit-tree saplings (Million)	2.0	2.7	6.5	11.2	25.7	25.0
- Seed potatoes (000 T.)	2.0	5.5	7.6	15.1	22.1	10.0
- Pest control (000 ha)	416	217	460	1,093	1,648	608
- Disease control (000 ha)	9	46	10	65	121	168
- Weed control (000 ha)	20	314	228	562	965	1,000
- Seed treatment (000 ha)	-	300	400	700	1,900	2,000
<u>Animal Production</u>						
- Sheep herd increase (000 head)	781	480	165	1,426	1,996	2,000
- Build 27 high pro- duction cattle stations (000 head)	-	-	-	-	9.0	16.2
Establish 250 cooperatives for dairy cattle breeding (000 head)	-	-	-	-	-	25.0
- Distribution and care of high production cattle (000 head)	-	-	6.0	6.0	10.3	8.0
- Raise productivity of domestic cattle breeds (000 head)	-	-	-	-	22	200
- Build poultry compounds (no.)	-	-	-	-	8	13
- Build fish hatcheries (no.)	-	-	-	-	15	6
- Exploit water pools (no.)	-	-	-	-	1	5
- Build concentrated feed factories (no.)	-	-	-	-	-	2
- Build green forage factories (no.)	-	-	-	-	1	3

Source: Targets from The Fourth Five-Year Economic and Social Development Plan of The Syrian Arab Republic, 1976-1980, Annex 2; data on actual and projected achievements from The State Planning Commission.

APPENDIX B. APPENDIX TABLES - CHAPTER II

Appendix Table II-1. Summary of Estimated Land Area and Climatic Characteristics by Type of Farming Area, Resource Planning Unit, and Production Potential Area, SAR

Region RPU - PPA	Extent of PPA	Elevation (m)	Dom. Range of Slope (Pct.)	Average Annual Precip. (mm)	WET SEASON CONDITIONS		
					Duration (Months)	AVC. MONTHLY	
						Precip. (mm)	Temp. (°C)
COASTAL 28-1	96,600	0-100	0-3	150-1000	NOV.-MAR.	>125	12-16
MOUNTAIN 29-1	24,800	400-1000	24-45	500-750	NOV.-MAR.	< 90	9-11
30-1	377,100	160-1600	15-45	160-1600	NOV.-MAR.	180	7-14
36-1	207,500	100-900	35-75	500-750	NOV.-MAR.	< 90->90	8-11
37-1	19,000	300-640	10-15	300-750	NOV.-MAR.	>60	7-11
37-2	35,400	300-940	15-30	300-750	NOV.-MAR.	>60	7-11
58-1	44,900	430-800	15-30	300-500	NOV.-APR.	>60	9-11
LOWLANDS 26-1	115,000	275-500	0-3	300-500	NOV.-APR.	< 60	7-9
26-2	268,500	275-500	0-3	300-500	NOV.-APR.	< 60	7-9
34-1	43,000	150-220	0-3	300-500	NOV.-MAR.	> 60	10-11
34-2	43,000	150-220	0-3	500-750	NOV.-APR.	>90	10-11
35-1	4,300	0-50	0-3	750-1000	OCT.-APR.	>125	13-16
35-2	4,300	0-50	0-3	1000-1500	OCT.-APR.	>180	13-16
35-3	33,900	50-260	15-35	750-1500	OCT.-APR.	>125->180	11-15
47-1	48,700	200-400	0-3	500-750	NOV.-MAR.	< 90	8-11
UNDUL. PLAINS 20-1	666,400	350-600	0-8	300-500	NOV.-MAY	< 60	10-13
20-2	83,300	350-600	0-3	195-289	NOV.-MAY	< 38	11-12
20-3	83,300	350-600	0-3	300-500	NOV.-MAY	< 60	10-13
23-1	23,000	550-600	0-3	300-500	NOV.-MAR.	>60	8-10
23-2	15,400	550-600	0-3	227-273	NOV.-MAR.	>38	8-10
24-1	36,000	500	0-3	< 300	NOV.-MAY	< 38	7-10
24-2	7,300	500	0-3	< 300	NOV.-MAY	< 38	7-10
24-3	4,600	500	0-3	< 300	NOV.-MAY	< 38	7-10
24-4	32,000	500	0-8	403	DEC.-APR.	83	10
24-5	6,400	500	0-3	300-500	DEC.-MAY.	>60	7-10
24-6	4,600	500	0-3	300-500	DEC.-MAY.	>60	7-10
25-1	100,800	250-500	3-15	<300-1500	NOV.-APR.	< 38-180	6-10
25-2	101,200	300-500	0-8	246-1500	NOV.-APR.	< 38-180	6-10
27-1	20,400	400-400	0-3	300-1000	NOV.-APR.	< 60	11-12
27-2	2,000	400-500	0-3	300-500	NOV.-APR.	< 60->90	11-12
27-3	1,500	400-500	0-3	300-500	NOV.-APR.	>60	11-12
27-4	1,500	400-500	0-3	500-1000	NOV.-APR.	>90	11-12
38-1	45,800	280-500	3-8	< 300	NOV.-APR.	>38	8-9
38-2	45,800	280-500	3-8	300-500	NOV.-APR.	< 60	9-12
38-3	91,900	280-500	3-8	300-500	NOV.-APR.	>60	9-12

(Continued)

Appendix Table II-1. (Continued)

Region RPU - PPA	Extent of PPA	Elevation (m)	Dom. Range of Slope (Pct.)	Average Annual Precip. (mm)	WET SEASON CONDITIONS		
					Duration (Months)	AVG. MONTHLY	
						Precip. (mm)	Temp. (°C)
UNDUL. PLAINS (CONT'D)							
48-1	397,200	290-520	0-8	224-299	NOV.-APR.	<38->38	9-11
49-1	87,100	350-600	0-8	100-500	NOV.-MAY	<60	8-10
57-1	415,600	350-660	8-15	259-500	NOV.-APR.	<38->38	12-14
EUPHRATES AND TRIB.							
32-1	257,200	175-250	0-3	101-207	OCT.-MAY	<38	13-16
32-2	85,800	175-250	0-8	101-207	OCT.-MAY	<38	13-16
40-1	55,300	260-360	0-3	195-234	OCT.-MAY	<38	14-14
40-2	90,300	260-360	0-8	195-234	OCT.-MAY	<38	13-14
40-3	55,300	260-360	0-3	300-500	OCT.-MAY	<60	12-13
40-4	90,200	280-360	0-8	300-500	OCT.-MAY	<60	12-13
42-1	86,600	260-400	5-8	<300	OCT.-MAY	<38	13-15
42-2	51,600	260-300	0-3	<300	OCT.-MAY	<38	13-15
NORTHEAST							
38-1	18,700	280-500	3-8	<300	NOV.-APR.	>38	8-9
38-2	18,700	280-500	3-8	300-500	NOV.-APR.	<60	9-12
38-3	37,500	280-500	3-8	300-500	NOV.-APR.	>60	9-12
41-1	10,000	400-500	3-15	222-272	DEC.-APR.	<38->38	9-11
41-2	1,200	400-500	0-3	272	DEC.-APR.	<38	9-11
41-3	1,200	400-500	0-3	222	DEC.-APR.	>38	9-11
45-1	139,500	300-400	0-8	150-250	NOV.-APR.	<38	11-12
46-1	715,000	370-500	8-15	186-291	DEC.-MAY	<38->38	11-13
46-2	153,000	340-450	3-8	186-291	DEC.-MAY	<38	12-13
46-3	153,000	340-450	3-8	<300	DEC.-MAY	>38	11-13
50-1	143,200	350-420	3-15	279-500	OCT.-MAY	<60	12-14
50-2	34,800	300-350	0-3	280	OCT.-MAY	<38->38	11-14
50-3	15,500	300-350	0-3	300-500	NOV.-MAY	<60	11-13
51-1	156,600	600-1000	8-35	245-309	NOV.-APR.	<60	8-11
51-2	44,800	400-450	3-15	245	NOV.-APR.	<37	7-10
51-3	22,400	400-450	3-15	300-500	NOV.-APR.	<60	10-11
52-1	46,300	400-520	8-15	<300	NOV.-MAY	>38	11-12
52-2	277,300	400-520	8-15	300-500	NOV.-MAY	<60	11-12
52-3	138,900	400-520	8-15	300-500	NOV.-MAY	>60	11-13
53-1	70,400	340-380	<3	300-500	NOV.-MAY	<60	11-12
53-2	70,400	340-380	<3	287	NOV.-MAY	<60	11-13
54-1	78,100	400-650	8-15	300-500	OCT.-MAY	<60	11-12
54-2	78,000	400-650	8-15	300-500	OCT.-MAY	>60	11-12
55-1	33,100	475-700	8-15	300-500	NOV.-MAY	>60	11-12

(Continued)

Appendix Table II-1. (Continued)

Region RPU - PPA	Extent of PPA	Elevation (m)	Dom. Range of Slope (Pct.)	Average Annual Precip. (mm)	WET SEASON CONDITIONS		
					Duration (Months)	Avg. Monthly Precip. (mm)	Temp. (°C)
NORTHEAST (CONT'D)							
56-1	20,200	500-600	8-10	500-750	NOV.-MAY	<90	11-13
56-2	20,200	500-600	8-10	500-750	NOV.-MAY	>90	11-12
SOUTHWEST							
2-1	73,280	600-1600	8-15	213-258	NOV.-MAR.	>38	7-10
2-2	109,920	600-1600	8-15	300-500	NOV.-MAR.	<60	3-8
3-1	295,200	400-800	3-8	235-400	NOV.-MAR.	>38	10-12
3-2	32,800	400-800	3-8	235-400	NOV.-MAR.	>38	9-12
4-1	156,500	800-950	8-15	<500	NOV.-MAR.	<60	5-11
5-1	31,200	500-1200	3-8	<300	NOV.-MAR.	>38	5-9
5-2	31,200	500-1200	3-8	500-750	NOV.-MAR.	>90	9-13
5-3	31,200	500-1200	3-8	750-1000	NOV.-MAR.	>125	8-13
5-4	31,200	500-1200	8-15	300	NOV.-MAR.	>38	5-9
5-5	31,200	500-1200	8-15	500-750	NOV.-MAR.	>90	9-13
5-6	27,400	500-1200	8-15	750-1000	NOV.-MAR.	>125	8-13
6-1	39,900	<0-350	>25	300-500	NOV.-MAR.	>60	12-14
6-2	17,100	<0-350	>25	500-750	NOV.-MAR.	>90	11-13
8-1	70,500	600-700	0-8	126	OCT.-MAY	<38	12-14
8-2	23,500	700-1100	20-30	126	OCT.-MAY	<38	12-14
9-1	73,600	750-1800	0-3	128-225	NOV.-APR.	<38	10-16
9-2	73,600	750-1800	0-3	257-268	NOV.-APR.	>38	10-16
9-3	8,150	1450-1900	20-30	128-225	NOV.-APR.	<38	3-8
9-4	8,150	1450-1900	20-30	257-268	NOV.-APR.	>38	3-8
10-1	68,400	600	0-3	136-167	NOV.-APR.	<38	9-11
15-1	150,100	1200-2600	>25	<300	NOV.-MAR.	<38-125	2-8
16-1	3,550	1200	0-3	500-750	NOV.-MAR.	>90	2-5
16-2	3,550	1200	0-3	300-500	NOV.-MAR.	>60	5-8
STEPPE							
1-1	868,590	700-1000	3-8	103	OCT.-APR.	<38	10-12
1-2	96,510	700	0-3	202	OCT.-APR.	<38	10-13
7-1	1606,000	600-750	0-8	107	OCT.-MAY	<38	13-15
7-2	602,000	600-750	3-8	107	OCT.-MAY	<38	10-15
7-3	200,000	700-1000	8->25	107	OCT.-MAY	<38	10-15
13-1	173,600	800-1000	0-3	129	OCT.-MAY	<38	10-13
13-2	115,800	900-1900	20-35	129	OCT.-MAY	<38	8-13
17-1	194,400	700	0-3	99	OCT.-MAY	<38	11-14
18-1	511,200	500-800	0-3	119-127	OCT.-MAY	<38	11-15
18-2	28,420	800-1200	25-40	119-127	OCT.-MAY	<38	11-15
18-3	28,420	500	0-3	119-127	OCT.-MAY	<38	11-15
19-1	1119,600	350-1300	8-45	142	OCT.-MAY	<38	10-14
19-2	197,600	600-1000	0-8	142	OCT.-MAY	<38	10-14
21-1	108,300	800-900	0-3	166-181	OCT.-MAY	<38	4-9

(Continued)

Appendix Table II-1. (Continued)

Region RPU - PPA	Extent of PPA	Elevation (m)	Dom. Range of Slope (Pct.)	Average Annual Precip. (mm)	WET SEASON CONDITIONS		
					Duration (Months)	AVG. MONTHLY	
						Precip. (mm)	Temp. (°C)
STEPPE (CONT'D)							
21-2	12,100	900-1200	3-15	166-181	OCT.-MAY	< 38	4-8
22-1	44,300	750-1750	25-45	208	NOV.-MAR.	< 38	4-10
31-1	1869,800	215-475	0-15	116-141	OCT.-MAY	< 38	11-16
31-2	1869,800	215-475	0-3	116-141	OCT.-MAY	< 38	11-16
31-3	208,000	215-475	0-15	300-500	OCT.-MAY	< 60	13-14
31-4	208,000	215-475	0-3	300-500	OCT.-MAY	< 60	13-14
33-1	42,400	150-200	0-3	< 300	OCT.-MAY	< 38	14-16
33-2	18,000	150-200	3-5	< 300	OCT.-MAY	< 38	14-16
39-1	222,100	300-420	3-8	150-200	OCT.-MAY	< 38	13-14
39-2	24,700	320-400	0-13	150-200	OCT.-MAY	< 38	13-14
41-1	81,600	400-500	3-15	222-272	DEC.-APR.	< 38-> 38	9-11
41-2	10,200	400-500	0-3	272	DEC.-APR.	< 38	9-11
41-3	10,200	400-500	0-3	222	DEC.-APR.	> 38	9-11

> = Greater than

< = Less than

Appendix Table II-2. Summary of Soil Characteristics by Type of Farming Area, Resource Planning Unit, and Production Potential Area, SAR

Region RPU - PPA	S O I L C H A R A C T E R I S T I C S				
	Depth to Bedrock	Texture	Permeability	Available Water Capacity	Drainage Class
COASTAL					
28-1	>1.5M	FINE	SLOW	LOW	WELL
MOUNTAIN					
29-1	< 50CM	MED.-FINE	MOD.	LOW	WELL
30-1	< 50CM	MED.	MOD.	LOW	WELL
36-1	10-50CM	MOD.FINE	MOD.	LOW	EXCESSIVE
37-1	30-50CM	MOD.FINE	MOD.	LOW	MOD. WELL
37-2	30-50CM	MOD.FINE	MOD.	LOW	MOD. WELL
58-1	10-50CM	MOD.FINE	MOD.	LOW	EXCESSIVE
LOWLANDS					
26-1	>1.5M	FINE	SLOW	LOW-MOD.	WELL
26-2	>1.5M	FINE	SLOW	LOW-MOD.	WELL
34-1	1.5-2M	FINE	MOD.	MOD.	MOD.-WELL
34-2	1.5-2M	FINE	MOD.	MOD.	MOD.-WELL
35-1	70-100CM	MOD.FINE	MOD.-SLOW	MOD.	MOD.-WELL
35-2	70-100CM	MOD.FINE	MOD.-SLOW	MOD.	MOD.-WELL
35-3	70-100CM	MOD.FINE	MOD.-SLOW	MOD.	MOD.-WELL
47-1	1.5-2M	FINE	SLOW	MOD.	MOD.-WELL
UNDUL. PLAINS					
20-1	< 50CM	FINE	SLOW	LOW	WELL
20-2	>50CM	FINE	SLOW	LOW	WELL MOD.-WELL
20-3	>50CM	FINE	SLOW	LOW	WELL MOD.-WELL
23-1	>50CM	MED.	MOD.	MOD.	WELL
23-2	>50CM	MED.	MOD.	MOD.	WELL
24-1	>1M	FINE	MOD.-SLOW	MOD.	WELL
24-2	>1M	MED.-FINE	LOW	MOD.	POOR
24-3	>1M	FINE	MOD.-SLOW	MOD.	MOD. WELL-POOR
24-4	>1M	FINE	MOD.-SLOW	MOD.	WELL
24-5	>1M	MED.-FINE	LOW	MOD.	POOR
24-6	>1M	FINE	MOD.-SLOW	MOD.	MOD.WELL- POOR
25-1	< 50CM	FINE	SLOW	LOW	WELL
25-2	1.5-2M	FINE	SLOW	LOW	WELL
27-1	< 50CM	FINE	SLOW	LOW	WELL
27-2	> 50CM	FINE	SLOW	LOW-MOD.	WELL
27-3	>50CM	FINE	SLOW	LOW-MOD.	WELL
27-4	>50CM	FINE	SLOW	LOW-MOD.	WELL
38-1	>1.5M	FINE	SLOW	LOW	MOD.-WELL
38-2	>1.5M	FINE	SLOW	LOW	MOD.-WELL
38-3	>1.5M	FINE	SLOW	LOW	MOD.-WELL
48-1	10-25CM	MED.-MOD. FINE	MOD.-MOD. FINE	LOW-MOD.	MOD.-WELL
49-1	30-50CM	MOD.FINE	MOD.-SLOW	LOW	MOD.-WELL
57-1	30-50CM	MOD. FINE-MED.	MOD. SLOW-SLOW	LOW	MOD WELL-WELL

(Continued)

Appendix Table II-2. (Continued)

Region RPU - PPA	S O I L C H A R A C T E R I S T I C S				
	Depth to Bedrock	Texture	Permeability	Available Water Capacity	Drainage Class
EUPHRATES AND TRIB.					
32-1	>1M	FINE	MOD.	MOD.	MOD.-WELL
32-2	>1M	COARSE	RAPID	LOW	WELL
40-1	>5M	FINE	MOD.-SLOW	MOD.	WELL
40-2	>1M	COARSE-MED.	MOD.-RAPID	VERY LOW	EXCESSIVE
40-3	>5M	FINE	MOD.-SLOW	MOD.	WELL
40-4	>5M/>1M	COARSE-MED.	MOD.-RAPID	VERY LOW	EXCESSIVE
42-1	>1.5M	MOD. COARSE	MOD.	LOW	MOD.-WELL
42-2	>1.5M	FINE	MOD.-SLOW	MOD.	WELL-MOD.-WELL
NORTHEAST					
38-1	>1.5M	FINE	SLOW	LOW	MOD.-WELL
38-2	>1.5M	FINE	SLOW	LOW	MOD.-WELL
38-3	>1.5M	FINE	SLOW	LOW	MOD.-WELL
41-1	<50CM	MED. COARSE	MOD.-RAPID	LOW	WELL
41-2	>50CM	FINE	SLOW	LOW	WELL
41-3	>50CM	FINE	SLOW	LOW	WELL
45-1	>1.5M	MOD. COARSE	MOD.	LOW	MOD.-WELL
46-1	25-50CM	MOD. COARSE	MOD.	LOW	MOD.-WELL
46-2	>1M	MOD. COARSE	MOD.	VERY LOW	MOD.-WELL
46-3	>1M	MOD. COARSE	MOD.	VERY LOW	MOD.-WELL
50-1	>50CM	MED.	MOD.	MOD.	WELL
50-2	>1M	MED.	MOD.	MOD.	MOD.-WELL
50-3	>1M	MED.	MOD.	MOD.	MOD.-WELL
51-1	30-50CM	MED.	MOD.	LOW	WELL
51-2	>50CM	MED.	MOD.	MOD.	WELL
51-3	>50CM	MED.	MOD.	MOD.	WELL
52-1	50-110CM	MED.-MOD. FINE	MOD.	MOD.	MOD.-WELL
52-2	50-110CM	MED.-MOD. FINE	MOD.	MOD.	MOD.-WELL
52-3	50-110CM	MED.-MOD. FINE	MOD.	MOD.	MOD.-WELL
53-1	>1.5M	MOD. FINE	MOD.	MOD.	DRAINED/POOR
53-2	>1.5M	MOD. FINE	MOD.	MOD.	DRAINED/POOR
54-1	>1.5M	FINE	SLOW	LOW	MOD.-WELL
54-2	>1.5M	FINE	SLOW	LOW	MOD.-WELL
55-1	10-25CM	MOD. FINE	MOD.	LOW	EXCESSIVE
56-1	>1.5M	FINE	SLOW	LOW	MOD.-WELL
56-2	>1.5M	FINE	SLOW	LOW	MOD.-WELL
SOUTHWEST					
2-1	<50CM	MED.	MOD.	LOW	WELL
2-2	<50CM	MED.	MOD.	LOW	WELL
3-1	>1M	FINE	SLOW	LOW	WELL-POOR
3-2	<50CM	MED. FINE	MOD.	LOW	WELL-POOR

(Continued)

Appendix Table II-2. (Continued)

Region RPU - PPA	S O I L C H A R A C T E R I S T I C S				
	Depth to Bedrock	Texture	Permeability	Available Water Capacity	Drainage Class
SOUTHWEST (CONT'D)					
4-1	< 50CM	FINE	SLOW-VERY SLOW	LOW	WELL-POOR
5-1	> 1M	FINE	SLOW-VERY SLOW	LOW	POOR
5-2	> 1M	FINE	SLOW-VERY SLOW	LOW	POOR
5-3	> 1M	FINE	SLOW-VERY SLOW	LOW	POOR
5-4	50-100CM	FINE	SLOW-VERY SLOW	LOW	POOR
5-5	50-100CM	FINE	SLOW-VERY SLOW	LOW	POOR
5-6	50-100CM	FINE	SLOW-VERY SLOW	LOW	POOR
6-1	< 50CM	MED. FINE	MOD.	LOW	WELL
6-2	< 50CM	MED. FINE	MOD.	LOW	WELL
8-1	> 1.5M	FINE	SLOW	LOW	WELL-MOD.
8-2	< 0.5M	FINE	SLOW	LOW	WELL-MOD.
9-1	> 1M	MED.	MOD.	MOD.	WELL
9-2	> 1M	MED.	MOD.	MOD.	WELL
9-3	< 50CM	MED.	MOD.	LOW	WELL
9-4	< 50CM	MED.	MOD.	LOW	WELL
10-1	1M	MED.	MOD. SLOW	MOD.	MOD. WELL-POOR
15-1	< 50CM	MED.	MOD.	LOW	WELL
16-1	> 50CM	MOD. FINE-FINE	SLOW	LOW	MOD. WELL
16-2	> 50CM	MOD. FINE-FINE	SLOW	LOW	MOD. WELL
STEPPE					
1-1	< 50CM	MED.	MOD.	LOW	WELL
1-2	> 1M	MED.	MOD.	MOD.	WELL
7-1	> 50CM	MED. COARSE	MOD.	LOW-MED.	WELL
7-2	< 50CM	FINE	MOD.	LOW	WELL
7-3	< 50CM	MED.	MOD.	LOW	WELL
13-1	> 50CM	MED. COARSE	MED.-RAPID	MOD.-LOW	WELL
13-2	< 50CM	MED.	RAPID	LOW	POOR
17-1	> 1M	MED. COARSE	MOD.-RAPID	MOD.-LOW	WELL
18-1	> 1M	MED. COARSE	MOD.-RAPID	MOD.-LOW	WELL
18-2	< 50CM	MED.	MOD.	LOW	WELL
18-3	> 1M	MED.	MOD.	MOD.	POOR
19-1	< 50CM	MED.	MOD.-RAPID	LOW	WELL
19-2	> 50CM	MED. COARSE	MOD.-RAPID	MOD.-LOW	WELL
21-1	> 50CM	MED. AND COARSE	MOD.-RAPID	MOD.-LOW	WELL
21-2	< 50CM	MED.	MOD.	MOD.	WELL
22-1	< 50CM	MED.	MOD.	LOW	WELL
31-1	< 50CM	COARSE	RAPID	LOW	WELL
31-2	> 50CM	COARSE-MED.	RAPID.-MOD.	LOW-MED.	WELL
31-3	< 50CM	COARSE	RAPID	LOW	WELL
31-4	> 50CM	COARSE AND MED.	RAPID-MOD.	LOW-MOD.	WELL
33-1	1.5-2M	MOD. FINE	MOD.	MOD.	POOR

(Continued)

Appendix Table II-2. (Continued)

Region RPU - PPA	S O I L C H A R A C T E R I S T I C S				
	Depth to Bedrock	Texture	Permeability	Available Water Capacity	Drainage Class
STEPPE (CONT'D)					
33-2	25-50CM	MOD.COARSE	MOD.	LOW	WELL
39-1	10-25CM	COARSE-MED.	MOD.	LOW-VERY LOW	MOD.-WELL
39-2	50-100CM	COARSE	RAPID	VERY LOW	EXCESSIVE
41-1	50CM	MED.COARSE	MOD.- RAPID	LOW	WELL
41-2	>50CM	FINE	SLOW	LOW	WELL
41-3	>50CM	FINE	SLOW	LOW	WELL

>= Greater than

<= Less than

Region RPU- PPA	IPC I/ _	SE 2/ _	R A I N F E D C R O P S 3/ 4/										
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	T R E E C R O P S			
										Olives	Citrus	Rosac.	Non- Rosac.
Coastal 28-1	M-H	L	M		H	H		M	H	H			H
Mountain 29-1	L	H	H ⁺		H ⁺							H ⁺	
30-1	L	H	L		L		L	M		M		L	M
36-1	VL	S										L	L
37-1	L	M			M							L	L ⁺
37-2	VL	S	M ⁺							M ⁺		M ⁺	M ⁺
58-1	VL	S											M
													L
													L
													M ⁺
Lowlands 26-1	M	L	M		M			M		M		M	M
26-2	M	L	M	M	M							M	M
34-1	H	VL	M		M							M	M
34-2	H	VL	M	M	M							M	M
35-1	M	VL	H							M		M	M
35-2	M	VL	H							M		M	M
35-3	L	S		H								H	H
47-1	M-H	L	H										

(Continued)

Appendix Table II-3. (Continued)

Region RPU- PPA	IPC 1/	SE 2/	R A I N F E D C R O P S 3/ 4/									
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS		
										Olives	Citrus	Rosac. Non- Rosac.
Undul. Plains												
20-1	L	M	L					M		M		
20-2	M-H	L	M									
20-3	M-H	L	M									
23-1	M	L	M									
23-2	M	L										
24-1	M-H	L	L									
24-2	L-H	L	L									
24-3	M-H	None	L									
24-4	M-H	L	M									
24-5	L-M	L	L									
24-6	M-H	None	M									
25-1	L	M	M-H									
25-2	M-H	L										
27-1	L	M										
27-2	M-H	L										
27-3	M-H	L										
27-4	M-H	L										
38-1	M-H	M										
38-2	M-H	M										
38-3	M-H	M										
48-1	L	VL	M ⁺									
49-1	L	VL-M										
57-1	L	M-S	L									

(continued)

Appendix Table II-3. (Continued)

Region RPU- PPA	IPC 1/	SE 2/	R A I N F E D C R O P S 3/ 4/								T R E E C R O P S		
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	Olives	Citrus	Rosac.	Non- Rosac.
Euphrates and Trib.													
32-1	M-H	L	L										
32-2	M	L-M	L										
40-1	M	VL											
40-2	M	VL											
40-3	M	VL	L										
40-4	M	VL	L										
42-1	M	M-S											
42-2	M-H	L	L										
North- East													
38-1	M-H	M						M					M
38-2	M-H	M						M					M
38-3	M-H	M											
41-1	L	M											
41-2	M-H	L											
41-3	M-H	L											
45-1	L-M	M-S											
46-1	L	S											
46-2	L-M	M-S	L										
46-3	L-M	M-S	L										

(Continued)

Region RPU- PPA	IPC 1/-	SE 2/-	R A I N F E D C R O P S 3/ 4/									
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS		
										Olives	Citrus	Rosac. Non- Rosac.
North- East (Cont'd)												
50-1	M	M-S	L									
50-2	M-H	VL	L									
50-3	M-H	VL	L									
51-1	VL	S										
51-2	M	M-S	L									
51-3	M	M-S	L									
52-1	M-H	M-S	L									
52-2	M-H	M-S	M									
52-3	M-H	M-S	M ⁺									
53-1	H	VL	M ⁺									
53-2	H	VL	L									
54-1	M	M-S										M
54-2	M	M-S										M
55-1	M	M-S										
56-1	M	M	H		M							
56-2	M	M	H		M							

(Continued)

Appendix Table II-3. (Continued)

Region RPU- PPA	IPC 1/	SE 2/	R A I N F E D C R O P S 3/ 4/									
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS		
										Olives	Citrus	Rosac. Non- Rosac.
South- West												
2-1	L-M	M	M					L	L	M		M
2-2	L-M	M	L									L
3-1	M-H	VL										
3-2	L	VL										
4-1	L	L-M										
5-1	M	L										
5-2	M	L										
5-3	M	L										
5-4	L-M	M										
5-5	L-M	M										
5-6	L-M	M										
6-1	L	H										
6-2	L	H										
8-1	M-H	L										
8-2	L	H										
9-1	M	L										
9-2	M	L										
9-3	L	H										
9-4	L	H										
10-1	M	L										
15-1	L	H										
16-1	M-H	L										
16-2	M-H	L										

(Continued)

Appendix Table II-3. (Continued)

Region RPU- PPA	IPC 1/	SE 2/	R A I N F E D C R O P S 3/ 4/									
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS		
										Olives	Citrus	Rosac. Non- Rosac.
Steppe												
1-1	L	L										
1-2	L-M	L										
7-1	L-M	L										
7-2	L	L										
7-3	L	H										
13-1	L-M	L										
13-2	L	H										
17-1	L-M	M										
18-1	L-M	M										
18-2	L	H										
18-3	L	L										
19-1	L	H										
19-2	L-M	L										
21-1	L-M	L	M									
21-2	L	M										
22-1	L	H										
31-1	L	L										
31-2	L	L										
31-3	L	L										
31-4	L	L										
33-1	VL	VL	L		L							
33-2	L	M										
39-1	VL	L										
39-2	L	VL										
41-1	L	M										

(Continued)

Region RPU- PPA	IPC 1/	SE 2/	R A I N F E D C R O P S 3/ 4/										
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	T R E E C R O P S			
										Olives	Citrus	Rosac. Non- Rosac.	
Steppe (Cont'd)													
41-2	M-H	L											
41-3	M-H	L											

Footnotes

1/ Inherent Productive Capacity:

- VL = Very Low
- L = Low
- M = Moderate
- H = High

2/ Susceptibility to Erosion:

- VL = Very Low or Slight
- L = Low
- M = Moderate
- S = Severe

3/ Crop Group Suitability Ratings:

- M = Medium L = Low
- H = High
- + = Successful crop production would require either extensive modifications such as terraces, drainage systems or breaking of impervious layers, and high levels of management

4/

- Crop Groups
- Small Grains = Wheat, Barley
- Pulses/Legumes = Chickpeas, Haricot Beans, Lentils, Vetches
- Vegetables = Cucurbits (Melons, Squash, Snake Cucumbers, etc.)
- Solanaceae CRP'S (Tomatoes, Eggplants, etc.)
- Cauliflower, Brassicaceae
- Crops (Other Vegetables)
- Okra

- Tumber and Bulb - Garlic, Onions, Potatoes, Sugar Beets
- Oil Crops = Peanuts, Sesame, Sunflower
- Rosaceous Fruit Trees = Almonds, Apples, Apricots
- Cherries, Peaches
- Non Rosaceous Fruit Trees = Figs, Pistachios, Pomegranates

Appendix Table II-4. Summary of Productive Capacity, Susceptibility to Erosion, and Irrigated Crop Suitability Ratings, by Type of Farming Region, Resource Planning Unit and Production Potential Area, SAR, 1979

Region RPU- PPA	IPC 1/	SE 2/	I R R I G A T E D C R O P S 3/ 4/									
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS		
										Olives	Citrus	Rosac. Non- Rosac.
Coastal 28-1	M-H	L	H		H	H		H	H	H	H	H
Mountain 29-1	L	H	⁺ H ⁺ L		⁺ H ⁺ L	⁺ L	⁺ L	⁺ E		⁺ L		
30-1	L	H										
36-1	VL	S										
37-1	L	M										
37-2	VL	S										
58-1	VL	S										
Lowlands 26-1	M	L	H	M	H	H	M		M	H	M	H
26-2	M	L	H	M	H	H	M		M	H	M	H
34-1	H	VL	H	M	M-H	M	H			M	M	M-H
34-2	H	VL	H	M	M-H	M	H			M	M	M-H
35-1	M	VL	H			H		H		H	H	H
35-2	M	VL	H			H		H		H	H	H
35-3	L	S										
47-1	M-H	L	H	H	H			H	H	H		H

(Continued)

Appendix Table II-4. (Continued)

Region RPU- PPA	IPC 1/ 2/	SE 2/ 3/	I R R I G A T E D C R O P S 3/ 4/												
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS					
										Olives	Citrus	Rosac. Non- Rosac.			
Undul. Plains															
20-1	L	M	M	H	H	H	M	H	H	H	H	H	H	H	H
20-2	M-H	L	H	H	H	M	M	H	M	H	H	H	H	H	H
20-3	M-H	L	H	H	H	M	M	H	M	H	H	H	H	H	H
23-1	M	L	H	H	H	M	M	H	M	H	H	H	H	H	H
23-2	M	L	M	M	M	M	M	H	M	H	M	H	H	H	H
24-1	M-H	L	M	M	M	M	M	H	M	H	M	H	H	H	H
24-2	L-M	L	M	M	M	M	M	H	M	H	M	H	H	H	H
24-3	M-H	None	H	M	M	M	M	H	M	H	M	H	M	H	M
24-4	M-H	L	M	M	M	M	M	H	M	H	M	H	M	H	M
24-5	L-M	L	M	M	M	M	M	H	M	H	M	H	M	H	M
24-6	M-H	None	H	M	M	M	M	H	M	H	M	H	M	H	M
25-1	L	M	H	H	M	M	H	M	H	H	M	H	M	H	M
25-2	M-H	L	M	M	M	M	M	H	M	H	M	H	M	H	M
27-1	L	M	M	M	M	M	M	H	M	H	M	H	M	H	M
27-2	M-H	L	M	M	M	M	M	H	M	H	M	H	M	H	M
27-3	M-H	L	M	M	M	M	M	H	M	H	M	H	M	H	M
27-4	M-H	L	M	M	M	M	M	H	M	H	M	H	M	H	M
38-1	M-H	M	M	M	M	M	M	H	M	H	M	H	M	H	M
38-2	M-H	M	M	M	M	M	M	H	M	H	M	H	M	H	M
38-3	M-H	M	M	M	M	M	M	H	M	H	M	H	M	H	M
48-1	L	VL	H ⁺	M ⁺		H ⁺								H ⁺	L
49-1	L	VL-M	M ⁺												
57-1	L	M-S	L												

(Continued)

Appendix Table II-4. (Continued)

Region RPU- PPA	IPC 1/ _	SE 2/ _	I R R I G A T E D C R O P S 3/ 4/ _											
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS				
										Olives	Citrus	Rosac. Non- Rosac.		
Euphrates and Trib.														
32-1	M-H	L	H	H	M	H	H	H					M	M
32-2	M	L-M	H	H	M	H	H	H					M	M
40-1	M	VL	H		M	M	M						M	M
40-2	M	VL	H	H	M	M	M						M	M
40-3	M	VL	H		M	M	M						M	M
40-4	M	VL	H		M	M	M						M	M
42-1	M	M-S												
42-2	M-H	L	H		M								M	
North- East														
38-1	M-H	M	H										H	H
38-2	M-H	M	H										H	H
38-3	M-H	M												
41-1	L	M												
41-2	M-H	L												
41-3	M-H	L	M											
45-1	L-M	M-S												
46-1	L	S												
46-2	L-M	M-S	M											
46-3	L-M	M-S	M	M										

(Continued)

Appendix Table II-4. (Continued)

Region RPU- PPA	IPC 1/	SE 2/	I R R I G A T E D C R O P S 3/ 4/											
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS				
										Olives	Citrus	Rosac.	Non- Rosac.	
North East (Cont'd)														
50-1	M	M-S	M						M	M			M	M
50-2	M-H	VL	M						M	M			M	M
50-3	M-H	VL	M											
51-1	VL	S												
51-2	M	M-S	M										M	M
51-3	M	M-S	M										M	M
52-1	M-H	M-S	H	H					H	H				
52-2	M-H	M-S	H	H					H	H				
52-3	M-H	M-S	H	H										
53-1	HH	VL	M ⁺						M ⁺	M ⁺			M ⁺	M ⁺
53-2	H	VL	M ⁺											
54-1	M	M-S	H							H			H	
54-2	M	M-S												
55-1	M	M-S												
56-1	M	M	H	H						H			H	H
56-2	M	M	H	H						H			H	H

(Continued)

Appendix Table II-4. (Continued)

Region RPU- PPA	IPC 1/ 2/	SE 2/	I R R I G A T E D C R O P S 3/ 4/														
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS							
										Olives	Citrus	Rosac. Non- Rosac.					
South- West																	
2-1	L-M	M	M														
2-2	L-M	M	H														
3-1	M-H	VL	H														
3-2	L	VL															
4-1	L	L-M															
5-1	M	L	H														
5-2	M	L	H														
5-3	M	L	H														
5-4	L-M	M	H ⁺														
5-5	L-M	M	H ⁺														
5-6	L-M	M	H ⁺														
6-1	L	H															
6-2	L	H															
8-1	M-H	L	H ⁺														
8-2	L	H															
9-1	M	L	H														
9-2	M	L	H														
9-3	L	H															
9-4	L	H															
10-1	M	L		M													
15-1	L	H															
16-1	M-H	L															
16-2	M-H	L															

(Continued)

Appendix Table II-4. (Continued)

Region RPU- PPA	IPC 1/	SE 2/	I R R I G A T E D C R O P S 3/ 4/							T R E E C R O P S			
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	Olives	Citrus	Rosac.	Non- Rosac.
Steppe													
1-1	L	L											
1-2	L-M	L		M	M	H	M			M			H
7-1	L-M	L	M	M	M		M	M					
7-2	L	L											
7-3	L	L											
13-1	L-M	L	M	M	M	H	M			M			H
13-2	L	L											
17-1	L-M	H	M	M	M	H	M			M			H
18-1	L-M	M	M	M	M	H	M			M			H
18-2	L	M											
18-3	L	L											
19-1	L	H											
19-2	L-M	L	M	M	M	H	M			M			H
21-1	L-M	L	M							M			
21-2	L	M							M				
22-1	L	H											
31-1	L	L											
31-2	L	L	H		H								
31-3	L	L											
31-4	L	L	H		H								
33-2	L	M											
39-1	VL	L											
39-2	L	VL	M	M	M	H	M						
41-1	L	M					M			M			H

(Continued)

Region RPU- PPA	IPC 1/	SE 2/	I R R I G A T E D C R O P S 3/ 4/										
			Small Grains	Cotton	Pulses	Vege- tables	Tuber and Bulb	Oil Crops	Grapes	TREE CROPS			
										Olives	Citrus	Rosac. Non- Rosac.	
Steppe (Cont'd)													
41-2	M-H	L	M										
41-3	M-H	L	M										

Footnotes

1/ Inherent Productive Capacity:

VL = Very Low
L = Low
M = Moderate
H = High

2/ Susceptibility to Erosion:

VL = Very Low or Slight
L = Low
M = Moderate
S = Severe

3/ Crop Group Suitability Ratings:

M = Medium
H = High
+ = Successful crop production would require either extensive modifications such as terraces, drainage systems or breaking of impervious layers, and high levels of management

4/ Crop Groups

Small Grains = Wheat, Barley
Pulses/Legumes = Chickpeas, Haricot Beans, Lentils, Vetches
Vegetables = Cucurbits (Melons, Squash, Snake Cucumbers, etc.)
Solanaceae CRP's (Tomatoes, Eggplants, etc.)
Cauliflower, Brassicaceae
Crops (Other Vegetables)
Okra

Tuber and Bulb - Garlic, Onions, Potatoes, Sugar Beets
Oil Crops = Peanuts, Sesame, Sunflower
Rosaceous Fruit Trees - Almonds, Apples, Apricots
Cherries, Peaches
Non Rosaceous Fruit Trees = Figs, Pistachios, Pomegranates

APPENDIX C

LIST OF PARTICIPANTS IN THE
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 H. Kunert, Questionnaire Designer
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Tennessee, Alabama, and Iowa)

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Nour Barmada, SPC	Bishara Sayaf, MAAR
Fouad Al-Numeyr, MSHT	Fouad Khardouss, MAAR
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Remote Sensing (2 months from March 1979 in Michigan)

Mouhedeem Taha	Abdul-Rahim Lulu
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(Continued)

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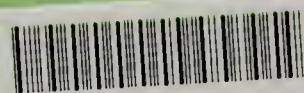
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